MEDICAL REPOSITORY.

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ARTICLE I.

DESCRIPTION *of the* CITY *of* LISBON; *ſhewing the Utility of conſtructing the Houſes, and paving the Streets of Cities, with Marble, Limeſtone, or other Calcareous Materials, in Preference to Silicious Materials, or Bricks of Clay. In a Letter from* HIPPOLYTO I. DA COSTA, *Eſq. of Liſbon, to Dr.* MITCHILL, *and recommended to every Philoſopher and Police-Officer in the United States.* (See Med. Repoſ. vol. ii. p. 39 & ſeq.)

DEAR SIR, *New-York, May* 21, 1799.

YOUR theory, in regard to the action of *alkalis* and *calcareous earth* upon ſepton, or the principle of corruption, is ſo well proved in the ſeveral papers you have publiſhed, that it is needleſs to adduce further proofs to perſons of knowledge: but as additional facts may be uſeful to perſuade people of leſs information or more prejudices, I believe I agree with your wiſhes in preſenting to you an account of the influence of calcareous earth upon the putrid effluvia in the city of Liſbon, which is, I think, a proof of the moſt intereſting nature.

The city of Liſbon (Liſboa) is ſituated on the northern bank of the river Tagus (Tejo), about eighteen miles from its mouth, in nearly lat. 38 degrees north, long. 65 degrees eaſt, from the meridian of Philadelphia: it is about ſix miles in length, and its breadth is, in ſome parts, two, in ſome three miles, although in ſome parts very narrow. In the moſt inhabited part of the city there are ſeven hills or mountains, which, of courſe, occaſion declivities and lower ſituations. This city may be divided into the *new* and *old* city; becauſe there is a ſpot which was overthrown by the horrible earth-

quake of the year 1755, and was rebuilt: I call, therefore, this part the new city. The ſtreets, in this quarter, are very regular, the buildings neat, and the pavements for foot paſſengers very commodious; but the ſituation is almoſt all very low.

The old city, or the part which did not ſuffer ſo much in the earthquake, and preſerves its ancient buildings, is in the Gothic taſte, with narrow and crooked ſtreets, in the moſt of which there are no pavements for foot paſſengers: the houſes are ſo high, that, in ſome of the narroweſt ſtreets, the ſun cannot be ſeen but two or three hours every day, viz. from eleven before noon, to one after noon. In the new city there are gutters or ſewers below the earth, to conduct the water and impurities from the houſes and ſtreets to the river; but in the old city there are none of theſe.

As the houſes are, in general, five or more ſtories high, and the ſtreets narrow, it is eaſy to conceive the thickneſs of population, and, of courſe, the vaſt quantity of impurity that comes into the ſtreets every day, which, with the water and other liquids poured in likewiſe, keep always there a vaſt quantity of dirt. A great ſum of money is appropriated, I know, and ſome pains taken, to preſerve the cleanlineſs of the city: but without entering into the diſcuſſion how this money is employed or diſpoſed of, which is but very little intereſting to our preſent inquiry, it is true that, very often, I have been obliged to make a great turn to go a ſhort diſtance, becauſe it was impoſſible to croſs the ſtreet through the dirt; and very often I have ſeen dogs, cats, and other dead animals, lie in the ſtreets.

There is, in every houſe (chiefly in the new city), a privy, with a canal, which goes up to the higheſt ſtory; becauſe, as the ſeveral ſtories are inhabited by different families, they want ſuch a convenience in every one: but this canal emits always a very bad ſmell, by the accumulation of impurities within its walls, which, from the form of its conſtruction, cannot be waſhed but with water, let in by a ſmall orifice or hole. There is alſo, in many houſes, a place in the inſide of the ſtreet door for making water, which contributes its portion of bad ſmell; and the houſes are, in general, not very clean.

Beſides all theſe ſources of putrid exhalations, there are a great many wharves, and much naked ſhore, which being uncovered by the ebb-tide, preſent to the ſun a ſurface covered with dirt and ſea-weeds, undergoing putrid fermentation. The mouths of the ſewers I have mentioned above go to the wharves,

and are likewiſe bare at low water. The fluid which comes from theſe ſewers contains ſo many infecting matters, that its ſtrong putrid ſmell can ſcarcely be endured.

After this ſhort deſcription of the police of Liſbon, in regard to its cleanlineſs, every body would draw the inference, that endemical diſeaſes muſt reign, not only in the ſummer, but in the winter time, ſeeing that the accumulation of the dirt in the ſtreets is incomparably greater in the winter than in ſummer. The connection there is between malignant diſtempers and dirtineſs, is very well known, and expreſſly marked by Tiſſot. (*Avis au Peuple ſur la Santè*, chap. ii. § 7.) Happily, Sir, the contrary is the fact: Liſbon is one of the moſt healthy ſituations I know, and its inhabitants do not ſuffer but the *common* diſeaſes to which the human body is ſubjected. Many people go from England and other countries to Liſbon, in certain diſeaſes, to enjoy the benefit of a ſalubrious place, and very often to ſpend the ſummer agreeably in a good and wholeſome climate.

What then can be the cauſe of this apparently phyſical contradiction between the impurity and corruption in the ſtreets, and the ſalubrity of the air? I confeſs, Sir, I cannot find any explanation of this phenomenon, if I reject the theory of the influence of calcareous earth upon ſeptic fluids, and I can well comprehend the reaſon if I admit it.

The buildings in Liſbon are all of *ſtone*, and, in general, of *marble of ſeveral qualities*, and chiefly the *marmor raſilis* of Linnæus; and this ſtone is procured in the neighbourhood of the city. All the houſes are *white-waſhed inſide* and *outſide*, and the handſomeſt new-faſhioned houſes are plaſtered with a plaſter they call *eſcariola*, a compound of gypſum and other matters, and painted over that compoſition in water-colours. As a number of new buildings are continually erecting, there are, in all the ſtreets, a great many ſtone-cutters, hewing the ſtones, and their fragments are ſcattered through the ſtreets. In the time of the earthquakes, as the houſes fall down, the attrition of the ſtones, one againſt the other, breaks them in pieces, reducing many to a powder. The pavements for the foot paſſengers are of *large marbles*; and, in many parts, the ſoil is *calcareous* too: and, in other parts, as the ſtreets are paved with ſmall round ſtones or pebbles, the accumulation of the *calcareous powder* makes a ſtratum above the ſurface of the ſtreets and public places. When the wind blows hard there is ſo great a quantity of *calcareous powder* flying about,

that it is incommodious to the eyes, and ſometimes is ſo fine, that it comes into the houſes even when the windows and ſaſhes are ſhut up.

Now, to what can I impute the healthineſs of that city but the quality of its *calcareous earth?* which neutralizes the *putrid exhalations*, or *ſeptic acid*, which impregnates the atmoſphere, and thus prevents its bad and fatal effects, preſerving that city, which otherwiſe would be the fountain of peſtilence, and the anti-chamber of death.

As no other cauſe can be diſcovered of the healthineſs of Liſbon, amongſt its continual putrid infection, recourſe may be had to the climate, and to the temperature of the atmoſphere; but I believe it can be ſufficiently proved, that the cauſe is the influence of the *calcareous earth*, and not of the climate; becauſe, if this ſalubrity was owing to the climate, all the neighbourhood of Liſbon, which enjoys the ſame climate, would enjoy the ſame healthineſs; but this is not the caſe. On the oppoſite bank of the Tagus, over againſt Liſbon, there are three or four villages, called Almada, Caparica, and Caſſilhas, ſituated on ſmall hills, and ſurrounded by beautiful farms: the buildings there are, in general, of *ſilicious ſtones*, the ſoil is ſandy, and in ſome parts clayey, and the ſtreets, in theſe villages, infinitely cleaner than in Liſbon; but intermittent and remittent fevers prevail in theſe villages and their neighbourhoods almoſt every ſummer, while, in the meantime, Liſbon is perfectly free. Near the other part of the river, in the neighbourhood of Liſbon, on the ſhore of the ocean, there are other ſmall villages, as Cintra and Collares, from whoſe neighbourhoods the ſtone of the Liſbon buildings comes, and the ſoil is, in a great part, calcareous. Theſe places are pointed out as the ſeat of health, and, indeed, are the moſt beautiful and pleaſant ſummer retreats you can imagime.

After this ſtatement, can any body attribute the ſalubrity of Liſbon to its climate merely? Certainly not: becauſe I obſerve, that where there is *calcareous earth* there is *no infection*, notwithſtanding the continual exiſtence of *putrid exhalations*; and where there is not *calcareous earth*, and the ſoil is ſandy, gravelly and clayey, there are *fevers*, although the climate is the ſame; the diſtance of theſe places being only the breadth of the river, about three miles.

To theſe unanſwerable facts I muſt add, that I have obſerved, two or three times, in Liſbon, dead animals upon the ruins of houſes, and, of courſe, ſurrounded with *calcareous*

earth, in a ſtate of deſiccation; and, at the ſame time, two or three fathoms diſtant, another animal dead too, and lying upon another kind of ſoil, in a ſtate of complete putrefaction. The reaſon of their preſervation is obvious: the *ſeptic acid* was abſorbed by the *calcareous earth*, as ſoon as it was formed by the union of ſepton with oxygene; likewiſe, the oil formed by the union of their hydrogene with carbone has been imbibed; the water, formed by the junction with oxygene, evaporated; and the remaining parts of the animal were left in a dry ſtate.

The effects of *calcareous earth* and *alkalis* ſeem to be very well underſtood by the people of Portugal: they put *chalk* and *plaſter* with the bodies they bury in the churches; and they waſh with plaſter the rooms where there has been any ſick of contagious diſorders. This precaution they never omit.—I pray you to accept my beſt wiſhes.

I am, dear Sir,

Yours very ſincerely and affectionately,

HIPPOLYTO I. DA COSTA.

SAMUEL L. MITCHILL, *Eſq.*

ARTICLE II.

A DISSERTATION *on the* BILIOUS MALIGNANT FEVER *which prevailed in the Country adjacent to Dartmouth College, in the Summer of* 1798. *Read before a Private Medical Society, at Dartmouth College, December* 12, 1798. *By* LYMAN SPALDING, *M. B. Lecturer on Chemiſtry and Materia Medica in Dartmouth College.*

IN the ſummer of 1798, many towns, in the country adjacent to Dartmouth College, were viſited by a typhus fever, of a type different from any thing heretofore ſeen in that part of New-Hampſhire and Vermont. It was prevalent in Hanover, Walpole, Unity, Windſor, Bethel, Royalton, Sharon, Barnard, Rockingham, &c. indeed, almoſt every town in the country round about was infeſted.

Hanover, Walpole, and Windſor, are handſome country towns, the compact parts of which contain nearly ſixty houſes, beſides ſhops, out-houſes, &c. The other parts of thoſe towns, and the other towns, are more thinly inhabited.

I ſhall confine my deſcription chiefly to the town of Hanover, where I was myſelf a ſufferer in the diſeaſe, as the fever was identically the ſame in all thoſe places.

Hanover is ſituated in the county of Grafton, on the weſtern border of the State of New-Hampſhire. The town is regularly built, on a ſmall plain, on the eaſtern bank of the Connecticut, half a mile from the channel, and ſeveral hundred feet above low water mark. On the eaſt, the town borders on a low meadow, that is drenched with water in the rainy ſeaſons. The ſoil is clay, mixed with ſand: the former is ſo predominant, that, in the rainy ſeaſons, the ſtreets are almoſt impaſſable. In a dry ſummer they are neat and good. The town is, in a great part, ſupplied with water, brought in barrels from a ſmall ſtream about half a mile ſouth of the college, called Mink-brook. In digging wells, we infallibly meet with a ſtratum of clay at different depth, ſooneſt at the ſouth end of the town. The well-water is neither cool, refreſhing, nor ſweet, but turbid, and, by reſt, depoſits an aluminous ſediment; *it is hard, and does not waſh*, but clots the ſoap. This water has never been chemically analized. There are a variety of ſtones, but the principal one is a compound, with quartz, but no limeſtone. Sulphurous pyrites is found in the neighbourhood. The timber, pine, maple, hemlock, birch, aſh, beech, &c. The ſoil is rich, yielding all kinds of grain and graſſes in perfection; neither is the horticulturiſt diſappointed.

The town is handſomely ſituated on this elevated plain, and conſtantly refreſhed by north, north-eaſt, and north-weſt winds, which are rendered wholeſome and animating by paſſing through extenſive foreſts. South winds are not ſo invigorating, but rather depreſſing to the ſtrength of body, and give a gloomy mind, reſembling exactly, in effect, the eaſt winds of our ſea coaſt. The college and preſident's houſe ſtand on an eminence, on the eaſt, commanding an extenſive variegated proſpect of the adjacent country; and immediately before them is a beautiful ſquare, unadorned by art; but nature has not been wanting on her part: with a ſmall expence it can be made to delight the eye of the man of taſte, and add health to the healthy.

The town has been heretofore exceedingly healthy; never was it viſited with any contagious diſeaſe, till the laſt ſummer, with the dyſentery.

The laſt winter was exceſſively cold and long, the ſpring was rainy; never have I ſeen ſo long and ſevere a rainy ſeaſon at the breaking up of winter. The ſpring ſeeding was much retarded. The ſummer was uſhered in at once, and was as remarkably *hot* and *dry* as the preceding winter and ſpring were cold and rainy. About the middle of June were ſeveral days almoſt inſupportable, and univerſally ſpoken of, by our oldeſt men, as the hotteſt ever known. [We have no thermometer in this place.] Vegetation was rapid, and the harveſt good.

Under theſe circumſtances the fever made its firſt appearance on the 25th of June, in a houſe, No. 1, ſtanding on the eaſt ſide of the main ſtreet, quite at the ſouth end of the town. This patient, Capt. B. had the fever very ſeverely; was a number of days deſpaired of; about this time he diſcharged a large quantity of freſh blood by ſtool, which very much alarmed the attendant phyſician; however, he recovered, though ſlowly.

The ſecond new caſe was Mr. E. preceptor of Moore's Academy. This was not ſevere, but terminated critically and favourably on the eighth day, with a diſcharge of blood from the noſe.

The third new caſe was light; the fourth and fifth ſevere.

July 10. This day four new caſes were reported, in a houſe nearly oppoſite No. 1, which I ſhall call No. 2. About the ſame time another perſon, whoſe buſineſs, in the day time, was at No. 2, was affected. Two of the four belonging to No. 2 died; one on the ſixth, and the other on the fourteenth day of the diſeaſe. In the third the diſeaſe continued thirty days before it came to a criſis, and his life was much deſpaired of.

It was my misfortune to be one of the four attacked on the 10th, the laſt in which a criſis was formed, and the one in which the diſeaſe was moſt favourable, though by no means inconſiderable. The diſeaſe was protracted to the fiftieth day before a criſis, and thirty days was I a convaleſcent.

July 15. Mr. B. in No. 1, was attacked very ſeverely with convulſions.

Aug. 22. Mr. A. of No. 2, while attending commencement exerciſes, was ſo ſeverely attacked as not to be able to walk three rods.

About the ſame time three others, belonging to No. 2, were ſeized. During this time about thirty perſons had had the fever in different parts of the town. When the fever had become almoſt extinct, a perſon who roomed at No. 2 was taken; from him the maid, from her a boy, from the boy a ſecond maid, all of whom had come to reſide at the houſe, No. 2, ſince the commencement of the fever, and two of them when the fever was in no other houſe in town. About the middle of December was the laſt new caſe, and this at No. 2. From this houſe there were probably fourteen perſons affected: I ſay *probably*, becauſe two were not of the family, but apprentices.*

The firſt ſymptoms of the fever were wearineſs, or laſſitude, ſtretching, yawning, languor, pain in the head, nape of the neck, back, loins, with deep ſeated ones in the limbs; watching, ſleep not refreſhing, jactation, nauſea and puking; loſs of appetite, faintneſs, univerſal inertia, pulſe variable, though generally ſmall and weak.

Theſe ſymptoms moſt generally appeared on the morning of the attack, after having gone to bed apparently much fatigued with the exerciſe of the day, with a ſlight cold, and ſome deep ſeated wandering pains like rheumatiſm. In the night, jactation, watching, uneaſineſs, and perplexity.

Puking up a large quantity of yellowiſh-green bitter matter, for ſeveral hours in the morning; by ten o'clock pains in the head, neck, back, loins and limbs, much increaſed, with a ſevere pain at the præcordia: theſe were attended with a cold ſhivering and liſtleſſneſs, and followed by a hot fit and increaſed pains, longing for freſh air, eyes filled with tears, heavy and red, much pain in their motion.

* Since reading the above diſſertation, I have ſeen Dr. Rand's obſervations to the A. A. S. on the ſame ſubject, in which he ſeems to think the fever was not contagious from the diſeaſed. With due deference to the opinion of ſo good a man, I muſt beg leave to add the following caſes in ſupport of my former opinion:

My brother, hearing of my ſickneſs, came twenty miles to my aſſiſtance, remained in my chamber almoſt continually for ſixteen days, taking the ſole care of me. About two weeks after his return he was attacked with the fever; no other perſon within three miles being affected.

In Windſor, a Miſs Bailey was very ſeverely attacked, in the ſickly part of the town, three miles from her father's: an elder ſiſter came to her aſſiſtance, and was immediate nurſe till ſhe recovered: then returning home, ſhe was herſelf attacked, and died. Another ſiſter, who was her immediate nurſe, and had ſeen no other perſon labouring under the diſeaſe, nor been in the infected part of the town, was alſo attacked, and died.

Flushing of the face, redness of the breast and præcordia, with great heat in those parts. Heat in the fauces; the tongue dry, parched, and discoloured, brownish, with thirst. Respiration difficult. Most generally the extremities were cold to the touch, and often the patient complained of their want of heat.

The heat at length subsides, and with it some of the most distressing symptoms, without any appearance of perspiration; though most generally with a dark coloured loose stool, and the evacuation of a small quantity of high coloured urine. The patient is now more comfortable, and can take a small quantity of food; but if the stomach be in the least overloaded, its contents are discharged. However, in the succeeding afternoon or evening the cold fit commences with redoubled violence, nausea, and, in the severe cases, puking a large quantity of dark coloured bilious matter: in one instance this resembled a strong blue dye, giving the bed linen the colour of indigo: the pains in the back of the head and neck are almost insupportable. This was succeeded by an increased hot stage: the face, breast, stomach, and region of the liver, appeared to be penetrated with living fire, while the extremities were cold. This hot fit continued longer than the former, and the succeeding ones were more protracted, till they continued the twenty-four hours almost uninterrupted. The skin was impervious, and communicated to the touch a peculiar biting, burning sensation; neither had the most powerful diaphoretics the desired effect. A total suppression of urine came on, and livid spots appeared on the skin.

The pains of the paroxysms were such as I cannot now call to mind, neither can I find words to convey an idea of them. On a sudden motion of the head, a sensation struck my mind, that only one half of it moved with its accustomed velocity; the other being tardy, in a few seconds came up, giving a sensation of the most violent concussion, leaving an almost insupportable pain for a few minutes. Motion of the eyes was like gouging them out.

Delirium during the paroxysm was a constant symptom in the violent cases: when fierce, it was an infallible sign of approaching dissolution; if with laughter and mirth, on the other hand, not to be dreaded. In watching, or disturbed sleep, there was a constant appearance of *ocular spectra*, passing and repassing, preventing refreshing sleep.

Spasms of the whole body, and of particular parts, with

ſubſultus tendinum, were not unfrequent. The pulſe, during the hot fit, were frequently hard and oppreſſed; but in the cold, and when there was no fit, ſmall, frequent, weak and irregular.

Deafneſs was not an unfrequent ſymptom, which very much alarmed the patient; while, in others, the ſenſe of hearing was ſo increaſed, that the leaſt whiſper gave pain.

Some few laboured under a conſtipation of the bowels, but moſt generally there was a purging, with black, fœtid, watery ſtools: theſe were conſidered dangerous, as they were more or leſs frequent and looſe. Fatality was early in the diſeaſe, with an evident incipient mortification.

The criſis of the fever was very evident: the more violent the attack, the more early the criſis, and the ſooner was health re-eſtabliſhed. In thoſe caſes which I have ſeen, ſcarcely two terminated critically on the ſame day; ſome as early as the fifth, while others were protracted to the fiftieth. One convaleſcent had a contraction of the flexor muſcles of the leg; another was affected with a lameneſs in the hip. Several ſhowed ſigns of hectic.

In the cure of this fever, ſome hurtful and *many* uſeleſs applications were made. It was not in the leaſt effected by thoſe applications which are moſt extolled in the fevers of our climate. Moſt of the practitioners had never ſeen it before, and thoſe who had, from motives of prudence, were unwilling to acknowledge its identity with that of Philadelphia.

On the firſt attack, an emetic, adminiſtered in ſmall doſes, to operate cathartically, relieved the ſymptoms. The effervеſcing mixture given in the hot fit gave univerſal relief. New beer and aceſcent potations were highly grateful.

Calomel, joined with other cathartics, was much uſed. Bliſtering, and mercurial unguent rubbed over the whole body, were uſeful.

Cold air was highly grateful, and eagerly ſought for. To eſtabliſh a current of air through the room was of the firſt conſequence: all the windows and doors were kept open, and the air put in motion by fanning. The rooms were conſtantly moiſtened with vinegar, or vinegar and water. Cleanlineſs was of the firſt conſequence: the patients were frequently waſhed all over with vinegar and water, accompanied with friction: a ſolution of muriate of ſoda was ſometimes made uſe of. Putrid ſtools were inſtantly removed, and the ſtench corrected. All unneceſſary apparel and furniture were removed.

But the moſt dependence was placed upon the *cold bath*, when the hot fit was on. This infallibly gave inſtant and aſtoniſhing relief, rendering the paroxyſms ſhorter and milder. It was applied either generally or locally, as the urgency of the caſe required: this was determined by the ſurface that appeared unuſually hot. When the heat was partial or local, a correſponding bath was uſed.

The cold bath was generally applied, by laying the patient naked upon a thick blanket, then ſprinkling him and the blanket with the coldeſt water: the wetted blanket was wrapped around him, and ſuffered to remain till it became warm; when it was thrown off, and ſprinkled a ſecond time; thus reducing the heat of the body to the ſtandard of health. The cold bath ſerved only till the criſis of the fever; afterwards it was as diſtreſſing and painful as heretofore it was invigorating and pleaſant. Many patients have been injured by a continuation of the bath after the criſis. Waſhing the hands and face in cold water was grateful.

When my fever formed a criſis, I did not know but the cold bath would be as uſeful as heretofore. When the hot fit came on, I ordered the nurſe to prepare the blanket, and ſprinkle me: the fit had proceeded to ſome length before we were in readineſs: the firſt daſh of water ſeemed to freeze every drop of blood in my veins, and chilled my bones to the very marrow. Never did I perceive ſo great a change in twenty-four hours, from the pleaſing and animating to the painful and diſtreſſing.

Bleeding did not produce that good effect which we had been taught to expect. I am ſupported in the opinion by phyſicians grown grey in the uſe of the lancet, that it was, in every inſtance, in all ſtages of the fever, *evidently injurious*. Neither was it found neceſſary to procure any ſudden evacuations; for *here* the diſeaſe ſcarcely terminated in the ſame number of weeks as hours at Philadelphia. Warm bathing was hurtful, except to the cold extremities.

Nitre, and other refrigerants and febrifuges had no laſting effect; opiates had not till after the criſis, neither had bark: this was now uſed with a liberal hand. A watery diarrhœa was the moſt troubleſome and pertinacious ſymptom.

The *chief indications* of cure, as delivered by my worthy friend Dr. Smith, in his courſe of lectures on the theory and practice of phyſic, are, to regulate the heat of the body according to the ſtandard of health, and ſupply the ſyſtem with ſuch ſubſtances as readily yield carbone.

To give an *impartial* hiſtory of the origin of the fever that prevailed in Hanover, and all the circumſtances which can be admitted as evidence of its having been brought from another place, or *generated* in this, I muſt firſt obſerve, that before the preſent ſeaſon, this fever had been wholly confined, in New-England, to the ſea-port towns, never having appeared in the country, nor within an hundred miles of this place; that none of the perſons who were firſt affected had viſited infected towns for the laſt ſix months preceding their attack, and many of them never had. It could not have been introduced by infected goods, for neither merchant nor his clerk had the diſeaſe. It appeared before the ſpring goods arrived, and as early as in other parts of the United States. It appeared in all thoſe country places about the ſame time. This evidence have we, to warrant us that we are not indebted to Boſton, Philadelphia, nor the Indies, for this fever.

On the other hand, it has generally firſt appeared in the moſt compact parts of our country towns, and in thoſe parts which have been moſt expoſed to putrefying animal and vegetable ſubſtances, where the houſes have been ſmall, and many perſons crowded together in the ſame room, where there has been a want of freſh air, cleanlineſs, &c.

At the ſouth end of the town of Hanover, where the fever made its firſt appearance, we were ſo unfortunate as to have the effluvia of a putrefying cow, and ſeveral leſſer animals, which lay within 150 feet of the main ſtreet, and about the ſame diſtance from No. 1 and 2. The effluvia of forty buſhels of potatoes muſt alſo be mentioned, which putrefied within twenty feet of the houſe No. 2, and leſs than forty from the main ſtreet. This houſe being ſmall and unfiniſhed, the weſt part open to the afternoon ſun, was uſed as a waſh-ſhed, and a receptacle of all kinds of kitchen filth: the ſoil being clay, the mould and upper ſtratum of clay retained all this filthy moiſture, which exhaled a deleterious gas, by the action of the afternoon ſun, which otherwiſe might have lain dormant.

The temple of Cloacina ſtood within thirty feet of the houſe. Here numbers of votaries had daily worſhipped that goddeſs for ſeveral years, and even without a vault. The temple ſtanding upon a ſouthern declivity, fronting the north, the ſun ſpent his whole force upon a large maſs of ordure, that emitted an odour fraught with death.*

* This gas is highly noxious, but may be deſtroyed by covering the cloaca with lime, which neutralizes the gas. I think it adviſable, in the

In June the family of the houſe No. 2 conſiſted of nine perſons, eight of whom took the fever; ſeven were among the firſt caſes: two died. The one who eſcaped left town before the diſeaſe made its appearance. Two other perſons, not of the family, who ſpent the day-time at No. 2, were affected. Three other perſons who became reſidents in this houſe ſuffered.

This is *evidence*, and evidence which I hold to be concluſive, that the diſeaſe *did originate* in Hanover, and in all the adjacent towns in which it appeared.

It now remains for me to aſſign a *cauſe* for this fever; but *cauſes are numerous as the ſtars, different as their magnitudes, and wide from the truth as the Ptolemaic hypotheſis.* But far from broaching a new hypotheſis, or *new vamping* an old cauſe, I ſhall cloſe my too lengthy diſſertation with ſome obſervations on putrid effluvia.

In thoſe caſes that terminated fatally there was an evident incipient mortification. If the corpſe had been ſuffered to go through all the ſtages of putrefaction above ground, *I am convinced*, that every perſon coming within its atmoſphere during its laſt ſtage, would infallibly have been affected by it. This deleterious gas cauſes the living fibre to commence the ſame action which gave riſe to itſelf, elſe how can we account for health, diſeaſe, death and putrefaction, in the ſhort ſpace of twelve hours, and in ſome caſes, report ſays, in leſs than three? Can this be conceived of, unleſs that which cauſes the diſeaſe cauſes the putrefaction alſo? for this does not commence for many days after violent or ſudden deaths.

Chemiſts and phyſiologiſts are agreed, that putrefactive effluvia have the power of cauſing putrefactive operations in all animal ſubſtances expoſed to their action.

ſummer ſeaſon, frequently to throw quantities of lime into every vault and place that emits putrid air.

ARTICLE III.

Obſervations on POT-ASH; *being an Inquiry how far the miſchievous Effects of Septic Acid are reſtrained by Pot-aſh, and other Alkalies, particularly in reſpect to the Effects of Septite of Pot-aſh (Nitre or Salt-Petre), upon Animal Fleſh intended to be eaten, and upon the Human Stomach. In a Letter from Dr.* MITCHILL *to Dr.* PRIESTLEY, *dated Plandome, May* 4, 1799.

ON a former occaſion (Medical Repoſitory, vol. ii. p. 236 & ſeq.) an attempt was made to ſhow that the *ſeptic* acid which is formed in certain putrefactive proceſſes, was materially different in its conſtitution and qualities from the *nitrous* acid, obtained by diſtillation from ſalt-petre. Since the compoſition of that piece, I have obſerved that JUNCKER, in his view of the doctrines of BECCHER and STAHL, (2 Conſpectus Chemiæ, p. 280.) is of the ſame opinion, declaring, that in whatever manner the work of ſeparating it from the putreſcent or other bodies with which it was naturally mingled, was undertaken, "ne micula tamen acidi nitroſi puri ſiſtitur," *not a particle of pure nitrous acid can be obtained.* And he warns his reader, that in the obſervations which he offers, he means that *ſpirit of nitre only*, which is liberated from its connection with an alkaline ſalt. On the native ſeptic acid, which is as he allows, furniſhed ſo largely by the animal kingdom, (p. 277.) and is by far the moſt active and intereſting form of oxygenated ſepton, JUNCKER, like moſt other writers, has ſaid ſcarcely any thing at all.

The highly deſtructive effects of this offſpring of putrefaction have been pointed out in detail in a former eſſay, (Medical Repoſitory, vol. i. p. 39—40.) in which it was obſerved, that certain ſubſtances, and among others, pot-aſh in particular, poſſeſſed a power to reſtrain and curb its ferocity. The neutral ſalt, formed by the union of this peſtilential acid, with the fixed vegetable alkali, is the ſalt-petre or nitre of the ſhops, and of commerce. Concerning the medicinal and economical qualities of this ſubſtance, it is manifeſt to me, there are many miſtakes yet prevalent, and they appear to be worthy of being pointed out and corrected.

The ſeptite of pot-aſh has been denominated a ſalt of many excellent qualities, a *ſal polychreſtus*; and a great phyſician once wiſhed, for the good of his profeſſion, there could be found *one* other remedy, ſo certain and ſteady in curing diſeaſes as nitre. It has likewiſe been termed an *antiphlogiſtic* remedy, good for all manner of inflammatory diſeaſes with phlogiſtic denſity of the blood, poſſeſſing fine attenuating powers, being in no wiſe acrimonious, and happily calculated to withſtand a putreſcent ſtate of the body. It has further been called a *refrigerant*, a *diuretic*, and *carminative*, and employed accordingly by thoſe preſcribers, who are influenced by the *nominal* efficacy of remedies.

Such are ſome of the ſuperlative effects aſcribed to this compound of the acid of peſtilence and pot-aſh; and, for a conſiderable time after I became acquainted with the miſchievous effects wrought occaſionally by the naked ſeptic acid, I remained in the belief, that the ſtrongeſt of the alkalies could hold it faſt and keep it intirely harmleſs. It, therefore, did not appear to me improbable, that the character of the compound of the two might, as in a multitude of other caſes, be exceedingly different from that of either the conſtituent acid or alkali.

But latterly I have been inclined to the opinion, that pot-aſh is capable of combination with oxygenated ſepton in different degrees; that is to ſay, ſepton before combining with the alkali, may have been united to *more* or *leſs* of oxygene; and alſo ſepton in any of its degrees of oxygenation, may be united with pot-aſh, in different proportions: in other words, the acid may *vary in its ſtrength*, and likewiſe, on every degree of ſtrength, may be united the alkali *in various proportion*. The *nitrum nitratum* deſcribed by the older chemiſts, is an example of pot-aſh *ſuperſaturated* with nitric acid, and, ſtrange to tell! has been extolled for its advantageous operation in ardent fevers, accompanied with thirſt and with a dry and foul tongue. I have ſtrong reaſon to think that there is a diſproportion between the acid and alkali in other forms of nitre, as I have known litmus-paper to be turned repeatedly reddiſh by a watery ſolution of ſalt-petre, the reſidue of a quantity, which was ſwallowed by miſtake, and which nearly deprived a man of his life. A ſet of correct experiments is wanting, to elucidate more completely this part of a very curious and highly important ſubject.

Be theſe things as they may, all experience ſhows, that the connection between ſeptic acid and pot-aſh is eaſy to diſſolve:

at leaſt, a portion of oxygene ſeparates very readily from the nitre. The experiment of reddening blood, by mixing powdered ſalt-petre with it, was known to *Hoffman*, and, I think, fairly evinces a partial decompoſition of the ſalt. It ſeems to have a ſimilar operation upon the reſidue of that fluid, in the fleſh of ſlaughtered animals; and the reddening of the lean and fibrous part of meat, is evidently owing to the oxygene attracted from the nitre.

But a heightening of colour is not the only effect which ſeptite of pot-aſh works upon proviſions ſprinkled with it. There are, in many meats, eſpecially of old animals, and of thoſe which have been a long time ſalted, a *toughneſs* and *hardneſs* which render them difficult to be cut and to be chewed. The ſeptic acid ſeems, in ſome degree, to be disjoined from the pot-aſh, and evidently aſſiſts in decompoſing, to a certain point, the vaſcular and fibrous ſtructure of the meat. The quantity of nitre generally put on is ſmall: was the proportion larger, the meat would be yet further diſorganized, and be rendered more *ſoft* and *tender*, almoſt even to *rottenneſs*. But the injurious effect of the nitre is prevented by the ſea-ſalt commonly mingled with it, in the manner, and upon the principle deſcribed in my "Obſervations on Soda." (Medical Repoſitory, vol. ii. p. 292 & ſeq.) The uſe of ſalt-pere then in curing proviſions is, to make them *reddiſh* and *tender*, and not to exerciſe an *antiſeptic* and *hardening* power, as the muriate of ſoda does.

With all theſe conſiderations before me, I entertained great doubts of the truth of thoſe fine things, told over and again, and copied by one writer from another, about the mildneſs and wholeſomeneſs of nitre, and of its wonderful effects as a calmer and ſoother of diſeaſes. It ſeemed very ſtrange to me, that the acid, which, before its union with pot-aſh, was capable of cauſing fevers, ſhould be ſo ſuddenly transformed, as, notwithſtanding the laxity of their coheſion, to cure ſuch diſeaſes immediately afterwards.

While I was conſidering theſe things, a caſe fell under my obſervation, which allowed me fully to witneſs the operation of this boaſted *cooler*, *carminative*, and *febrifuge*. It ſhows, beyond a doubt, that ſeptic acid, though coerced by pot-aſh, is, in ſome degree, ſeptic acid ſtill. Its native virulence does not, even then, wholly forſake it. Nitre ought to be ranked among the poiſons; for, in a ſufficient doſe, it is truly a poiſon. Though it may be adminiſtered in ſmall quantities, without

exciting terrible ſymptoms; it reſembles, in that reſpect, moſt other venomous ſubſtances, which can be ſwallowed without detriment, and even often with advantage, when their doſe is not too large. It is time for writers of Diſpenſatories, and on Materia Medica, to know the facts concerning nitre and its operation, and to publiſh them for the ſake of undeceiving their readers. Too long has the medical world been the dupe of idle and partial opinions on this ſubject. Read the following accident, and judge of what I have ſaid, from the ſymptoms induced by ſwallowing ſeptite of pot-aſh or ſalt-petre:

A cartman, of middle age, had followed his buſineſs, as uſual, on Saturday the twentieth day of April, 1799. On Sunday morning he determined to take a ſaline cathartic, for an indiſpoſition too trifling to require the advice of a phyſician. Accordingly, his wife diſſolved an ounce of what ſhe believed to be ſulphate of ſoda (Glauber's ſalts) in water, and gave it to him at a draught. He ſwallowed it. Soon after he was ſeverely incommoded by what he termed "a great weakneſs about his heart." Nauſea came on, and was followed by vomiting of the contents of the ſtomach, mixed with conſiderable quantities of blood at each time. His ſtrength was exceedingly impaired, and a ſenſation of coldneſs over the whole body was remarked by him, particularly in the extremities. I did not ſee him until after the bloody vomiting had continued, at times, for ſeveral hours, and then his pulſes at the wriſt were very ſlow. He was, however, quite rational, and ſaid he then felt much better than he had done. On examining what ſort of ſalt he had taken, for ſome cryſtals of it remained in a wide-mouthed bottle, I found it to be ſeptite of pot-aſh, (ſalt-petre.) This was about eleven o'clock before noon, and he had taken it at ſix in the morning. As it had had no purgative effect, I ordered him ſome caſtor-oil, and almond milk, ſweetened with ſugar, or ſome milk whey, and ſome water-gruel.

In 35 Commentar. de rebus, &c. p. 176, a caſe is mentioned of death from taking an ounce of nitre; and if a part of the quantity which this man took had not been vomited up, he probably would have died too. The ol. ricini purged him gently, and he gradually got better, but complained very much of weakneſs about the præcordia.

There are numerous other accidents not materially unlike theſe. Such occurrences give us no very favourable account of the benignity of nitre as a medicine. It is a pity that prac-

riſers of phyſic do not better underſtand the component parts of their preſcriptions. How few know, that in adminiſtering nitre, their patients are made to ſwallow a portion of the nauſeating and ſickening acid of putrefaction!

Poſſibly theſe remarks may have a tendency to remove the doubt contained in your letter of April 11, 1799. You will hereby perceive, that *my native acid of ſepton* is a combination of this baſis with oxygene and water, whereas your *artificial acid of nitre* undergoes a partial decompoſition by the heat of diſtillation, and is adulterated beſides with whatever happens to be mingled with it, during and after its combination with the vegetable fixed alkali; and both theſe forms of acid differ from atmoſpherical air, inaſmuch as the former are *chemical* mixtures, the latter is *mechanical*.

It would be better for ſcience, if the word "nitre" was rejected altogether from uſe. *Nitria*, whence the term comes, was, you know, a diſtrict of ancient Egypt, famous for the quantity of mineral alkali which it afforded. (D'Anvilles Geograph. Egypt.) This ſaline ſubſtance has thence been called by the names *nitrum*, *nitre*, &c. In confirmation of which, I obſerve in the Dictionary of CALLEPINUS, printed at Baſil, in 1538, that what they called *nitrum*, was a material employed to cleanſe clothes, and waſh the bodies which wore them. And S. BOCHART remarks, (1 Opera. Chanaan, lib. i. chap. 14.) that the ancients made a kind of ley from *aſhes*, *ſoda* and *bole (cinere, nitro et cimoliâ)*, for more effectually clearing their bodies from naſtineſs, when they bathed. I need not remark to you, that I employ the word "nitre," not in its ancient, but modern ſenſe.

It is highly deſirable, that ſome of our men, whoſe opinions have weight with the public, would peruſe the work of Lanciſi, phyſician to Pope Clement XI. on the noxious exhalations of marſhes. (De Nox. Palud. Effluviis.) By the perſevering and luminous reſearches of this great man, it was found, as long ago as the year 1716, that marſh-water, by ſimple diſtillation, (ibid. lib. i. cap. 12.) manifeſted an *acid* quality, and that *calcareous* ſtones (ibid. lib. ii. cap. 2.) were better for paving the ſtreets of cities than *ſiliceous* ones, becauſe the *alkaline nature* of the former was adapted to imbibe the noxious moiſture of the air, and ſweeten the *acid ſalts* with which it abounded. Indeed, much of the matter detailed by the writers of our days, on local ſources of diſtempers, may be found better obſerved, and better ſtated by Lanciſi, than in their writ-

ings. By the bye, I obſerve he mentions the Engliſh philoſopher MAYOW. (Ibid. lib. i. p. 1. chap. 2.)

If the philoſopher of Rome had reaſoned upon his own diſcovery, he could not have failed to draw the inference, that by *alkaline ſubſtances*, might the HYDRA of peſtilence be overcome.—As I have mentioned this monſter, I ſhall pauſe a little to give you my opinion of the allegory among the ancients concerning her; and I attempt the explanation the more willingly, as I believe *Lord Verulam* has ſaid nothing about it. The fable is this: In Peloponneſus, between Mycenæ and Argos,* there was a fen, or marſh, of ſome extent, called Lerna. This muddy and ſtagnating pool was inhabited by Hydra, a horrible and devouring monſter, with ſeveral heads; ſome ſay ſeven, others nine, and others fifty. The malignity of her poiſon was ſuch, that a wound from an arrow dipped into it was inſtantly mortal. She made dreadful havock among the people of the ſurrounding country, and devoured a great number of their ſheep and other cattle. In obedience to the orders of the tyrant Euryſteus, Hercules went to fight this deſtructive and formidable creature. On his approach, a crab came forth to the aſſiſtance of Hydra. But Hercules cruſhed the crab, and afterwards ſlew Hydra. Of the heads of Hydra, it was reported, when one was cut off two would ſprout from the wound, unleſs prevented by the immediate application of fire. Hercules availed himſelf of the aid of fire, and ſucceeded in his undertaking.—In the ninth figure of MONTFAUCON's 66th plate there is a figure of Hercules, with crabs near his feet, having, as the learned father curiouſly enough remarks, a relation to ſome myſtery which he does not comprehend. (1 Antiquity explained. Art. Hercules. Chap. ix.)

Now, it appears to me this is an allegory expreſſive of the peſtilential vapours emitted by the bog of Lerna, and of the means found, by experience, uſeful to drain off its ſtagnant water, and to clear the adjoining and ſurrounding moraſſes.

The word "hydra" is derived from ὑδωρ, *water*. This fluid, then, detained upon the marſh of Lerna, favoured, occaſionally, the production of unwholeſome exhalations. Such vapours, being at once inviſible and injurious, were aſcribed to ſome preternatural enemy, or deſtructive monſter; and be-

* I know that in determining the place where the ſen of Lerna exiſts I differ from that prince of geographers, d'ANVILLE, who has placed it nearer the Argolic gulf. As this is not material to the argument, I merely mention it.

ing diffuſed or wafted around the country, and oftentimes cutting off both man and beaſt, were fancied to be the effect of the ſuppoſed monſter's poiſon. According to their extent and virulence was ſhe reported to have fewer or more heads for preparing and inflicting this poiſon. The mere draining off the water, and leaving the mud and ſlime bare, was termed cutting off an head; and the increaſe of deleterious gaſes in conſequence of expoſing ſuch a naked ſurface, was aptly expreſſed by the ſprouting forth of two in its place. By cauterizing, or ſearing, was underſtood, either the ſolar heat in drying the ground after the water was drained away, or the burning up of the trees, ſhrubs and obſtacles, to free ventilation, by ordinary combuſtion, or perhaps both. The crab, who was Hydra's ally, perhaps does not refer to the ſun's place in the conſtellation Cancer, ſo much as to ſhow the frequent recurrence of the difficulties, and the ſuperior ſtrength and ſkill requiſite to overcome them. In the whole allegory "Hercules" may be underſtood to mean, "inſuperable courage and induſtry."—North-America, at the cloſe of the eighteenth century, wants a HERCULES.—This interpretation is confirmed by another conſideration, that the ancients had not only their *hydra*, who lived in the water, but their *Cherſydra*, who remained after the marſh or fen was dried up. *Cherſydra* being derived from the two words, χερσος, *land not fit for the plough*, and ὑδρα, *the monſter of the fens*, will thus mean the venomous and ſickly condition of the neighbouring atmoſphere after the water was exhaled, and the ground at the ſame time not rendered arable thereby, typified by a poiſonous ſerpent; and was thus expreſſive of the rage of peſtilential effluvia, which ſome times, and under certain circumſtances, continue in a virulent ſtate, in dry weather, near their dried ſources.

Hydra is ſeemingly mentioned by VIRGIL (Æn. 6. v. 576.) as a *fictitious* or *poetical* animal. BOCHART, however, with his uſual prodigious erudition, appears deſirous to make the whole ſtory *literally* intelligible (Hierozoici pars poſter. lib. iii. chap. 13.) But LANCISI, with a more clear and diſcriminating mind, perceives that important phyſical truths are concealed under this twofold allegory, and ſhows how they are to be unriddled. (De Nox. Palud. Effl. lib. i. p. 2. cap. 3.) In conſidering theſe matters, you will not fail to recollect, that the claſſical writers, and others, uſe the word "hydrus," as well as "hydra," and ſome of them apparently confound the two. The former noun of the maſculine gender is probably

the name of the *real* animal, the *water-ſnake*; the latter of the *imaginary* one. But of this enough.

If peſtilential matter, as I obſerved before, can be ſubdued by alkalies, then the formation of ſeptite of pot-aſh, in the alimentary canal, muſt be a very frequent and common proceſs. It is univerſally agreed, that peſtilential matter may be taken into the ſtomach by ſwallowing, and no reaſonable doubt can be entertained of its production, within that organ, and other parts of the inteſtinal tube, from the corrupted remains of food. The whole tenor of preſcription, as explained in my letter concerning the uſe of alkaline remedies in fevers, (Medical Repoſitory, vol. i. p. 265.) goes to ſhow, that the offending cauſe is of an acid quality, and, in its worſt forms, I think the acid engendered has ſepton for its baſis, ſince aliment, containing this principle only, is capable of yielding that moſt noxious compound. When ſeptic acid thus exiſts in the alimentary canal, and carbonates, tartrites, &c. of pot-aſh are taken down, the ſtronger acid is attracted, and a proportional quantity of nitre or ſalt-petre is formed. Thus, in abundance of caſes, the practiſers who are fond of preſcribing ſeptite of pot-aſh, might ſpare themſelves the trouble, as that ſaline compound is, in certain caſes, formed in the ſtomach and bowels in conſiderable quantity. What preciſe effect the *nitre ſo formed* has in the inteſtines, and on the conſtitution at large, deſerves to be inquired into with great care; for I am not without apprehenſion, that ſome of the ſad ſymptoms occaſionally attendant on fevers, are modified by the ſeptite of pot-aſh formed within the belly.

ARTICLE IV.

CASE *of* TETANUS *cured by* WINE. *Communicated in a Letter to Dr.* JAMES GREGORY, *Profeſſor of the Practice of Phyſic in the Univerſity of Edinburgh, by Dr.* DAVID HOSACK, *Profeſſor of Botany and Materia Medica in Columbia College.*

New-York, March 12, 1799.

THE treatment of lock-jaw by the uſe of *tonic remedies*, has been long ſince ſanctioned by the ſucceſsful practice of Dr. Cochran of Nevis, (ſee Med. Commentaries, vol. iii.)

Dr. Wright of Jamaica, (ſee Lond. Med. Obſ. and Inq. vol. vi.) Dr. Ruſh of Philadelphia, (ſee American Phil. Tranſactions) and Dr. Currie of Liverpool, (ſee Med. Mem. of London, vol. iii.) but the ſame treatment, in other hands, has not been equally ſucceſsful, inſomuch that it is ſtill conſidered as one of thoſe diſeaſes which generally baffle medical preſcription. To what cauſes is this failure to be aſcribed? Not to any defect in the principle upon which thoſe remedies have been preſcribed: the caſes which have been recorded of the ſucceſs of tonic medicines are too numerous to admit a doubt, that the proximate cauſe of lock-jaw conſiſts in an exhauſted ſtate of the ſenſorial power from violent irritation applied to the nervous ſyſtem: ſtimulants and tonics are, therefore, the remedies which are beſt calculated to reſtore this loſt energy. Their failure I have conſidered to proceed from the complicated and inert manner in which they have uſually been adminiſtered.

In the greater number of caſes which I have either witneſſed in practice, or remember to have ſeen deſcribed, the *bark*, *wine*, *cold-bath*, and, in many inſtances, *opium*, *muſk*, and *mercury*, have been exhibited at the ſame time: I muſt except one caſe, recorded by Dr. Currie, in the Memoirs of the Medical Society of London, in which, the patient rejecting the mixture of *bark* and *wine*, the bark was omitted, and the wine was employed alone, which ultimately effected a cure; but in this caſe, opium, mercury, and the cold and warm bath, had been previouſly employed, but to no purpoſe.

This complicated mode of practice cannot but be prejudicial in any diſeaſe; in lock-jaw it muſt eſpecially prove injurious, by harraſſing the patient, and by offending the ſtomach with the diſcordant and nauſeous mixture of the remedies above-mentioned: if, therefore, a practice more ſimple, and, at the ſame time, more efficacious can be deviſed, it is certainly a deſideratum in the treatment of this formidable and fatal diſeaſe.

Having, in a variety of diſeaſes, attended with great exhauſtion of the vital powers, employed wine alone, with ſucceſs, without the uſe of thoſe remedies which are uſually preſcribed in this condition of the body, I long ſince reſolved to give it a trial in lock-jaw.

In January, 1798, a merchant of this city, while engaged in opening a box of goods, ſtruck the inſide of his right-hand upon a nail; the ſkin was conſiderably torn, but the wound did not appear to extend beneath the integuments. In twenty-

four hours his hand became painful, and ſwelled, attended with great heat and redneſs, which ſpread over the wriſt. He immediately applied a poultice of bread and milk to the part affected. In forty-eight hours the pain extended the whole length of his arm, and produced ſome uneaſineſs about his throat, eſpecially in the act of chewing and ſwallowing. He became alarmed, and applied to me for advice. I found him in great pain; but being free from fever, I directed him to have recourſe to *wine*; to take a large wine-glaſs full every hour until his pain was removed; and, in addition to the uſe of wine, to apply a compreſs, wet with ſpirits, to the wound. When he had taken to the amount of four glaſſes, he felt himſelf very ſenſibly relieved; and by the occaſional uſe of the wine for twenty-four hours, his pains entirely left him; the ſwelling ſubſided, and, in a few days, the wound was healed, without any unpleaſant appearances.

What would have been the progreſs and termination of this caſe, had it been left to itſelf, is uncertain; but the immediate good effects of the treatment preſcribed encouraged me to make trial of the ſame remedy in a caſe where the diſeaſe might appear in a more formidable ſhape.

On Tueſday, March 13, 1798, about one o'clock P. M. I was called to viſit a mulatto ſervant woman of John Harrington, Eſq. of this city. I was informed that about an hour before, while engaged in waſhing clothes, ſhe had pricked herſelf with a pin in the wriſt of her right-arm. The part at which the pin entered was upon the inſide of the wriſt, immediately over the connection of the radius with the carpus.

The pin was inſtantly removed, and, finding no inconvenience from the accident, ſhe returned to her employment. In a ſhort time ſhe felt a great degree of foreneſs in the part which had been injured, with pain ſhooting occaſionally to the arm, ſhoulder and neck. Theſe ſymptoms, in a few minutes, were ſucceeded by ſtiffneſs about the throat, difficulty of ſwallowing, ſome interruption of her ſpeech, and, at length, a locked ſtate of the jaws, attended with a ſpaſmodic contraction of the muſcles at the back part of the neck, and occaſional ſubſultus tendinum, with ſome coldneſs of her extremities. In this ſituation I found her.

She was naturally of a delicate and irritable habit of body, and had been much ſubject to hyſterical complaints and fits of fainting, which were ſometimes induced by the moſt trifling cauſes. Her irritability of habit was alſo at this time proba-

bly increaſed, having but three months before borne a child, which ſhe was then ſuckling.

Although I have been long ſince convinced of the inſufficiency of opium in the cure of this diſeaſe, in the hurry of the moment I gave her about ſixty drops of laudanum, in a ſmall quantity of wine. Her jaws being cloſely locked, it was with great difficulty adminiſtered. In a few minutes after ſwallowing the laudanum ſhe ſickened at the ſtomach, and vomited violently; complaining at the ſame time of great pain and diſtreſs at the pit of her ſtomach. The anodyne draught was entirely rejected; but, upon a moment's reflection, I did not regret this circumſtance, as the diſeaſe aſſumed a very decided character, and I had made up my mind to rely upon the effects of wine alone, without the aſſiſtance of any other remedy: accordingly, about two o'clock, I directed a large wine-glaſs full of *Madeira wine* (the glaſs containing about two ounces), to be given punctually every hour, and a cup of ſago, or panado, with wine, to be given, from time to time, as her nouriſhment. At this time another phyſician, who had alſo been called upon at the time of the accident, arrived. I related to him what had been done, and the mode of treatment which I directed for the patient. This gentleman having had frequent opportunities of ſeeing this diſeaſe, and having frequently witneſſed the failure of the ordinary mode of treatment, he at once, with great candour, acceded to the plan propoſed, and, in addition to the uſe of wine, propoſed the application of cauſtic to the part which had been wounded. Accordingly the wound was freely pencilled with the lunar cauſtic, and afterwards covered with a poultice of bread and milk, with the view to obtain ſuppuration as ſoon as poſſible.

The wine was adminiſtered with great fidelity by the mother of the patient, until about five o'clock the next morning. She had ſome ſlight convulſions in the courſe of the afternoon, but they were more of an hyſterical ſort, induced by her great anxiety of mind, than to be aſcribed to the diſeaſe itſelf. Generally ſpeaking, there had been a very manifeſt abatement in all her ſymptoms, and ſhe had paſſed a more comfortable night than could have been expected. At five o'clock on Wedneſday morning, her miſtreſs, alarmed at the quantity of wine ſhe had taken, deſiſted from its further uſe. From this time, appearances became more unfavourable, and at eight o'clock her jaws, which had been relaxed during the plentiful uſe of wine, again became ſtiff and cloſed. We ſaw her at nine, and im-

mediately gave her about half a pint of wine, and ordered it to be adminiſtered as before. At one her ſymptoms were greatly changed; we found her ſitting up in bed, eating ſmall portions of roaſted oyſters, which ſhe had called for. At this time her jaws were almoſt in their natural ſtate. She had taken her wine punctually as directed, but experienced no inconvenience from it whatever, although in health ſhe had not been accuſtomed to its uſe. Her pulſes were ſtill ſmall and feeble, without any excitement from the uſe of wine. The heat of body remained at its natural ſtandard, but not at all increaſed. The pain in her head was abated, but without any appearance of ſuppuration. Finding this mode of treatment to agree ſo well with her, we directed it to be continued. We ſaw her again in the evening; her ſymptoms ſtill continued favourable, without the ſmalleſt febrile action from the uſe of wine. Having had no diſcharge from her bowels ſince her illneſs, an injection was adminiſtered; which remedy was afterwads employed from time to time in the courſe of her diſeaſe, whenever the ſtate of her bowels required it. The wine was continued through the night: ſhe ſlept, altogether, about three hours in the courſe of the night; and took freely of her panado.

Thurſday morning at nine o'clock, her complaints appeared to be, in a great meaſure, ſubdued; inſomuch that we did not think it neceſſary to viſit her again until late in the evening, and directed the wine to be given at longer intervals, and the quantity to be leſſened.

She remained in a very comfortable condition until the afternoon—the *pain in her hand returned* with violence, extending to her arm and neck as before—her jaws were again cloſed—the rigidity of the muſcles at the back of her neck returned—her mind became greatly agitated—ſhe again complained of diſtreſs at the pit of her ſtomach—ſhe fainted, and had ſeveral ſlight convulſions. Being called at that time, I gave her, with ſome difficulty, about half a pint of wine, and ordered a warm poultice to be immediately boiled. When prepared, I poured upon the ſurface of it, half an ounce of laudanum, and applied it to the wound. Her ſymptoms were in a ſhort time allayed: I left her, directing the wine to be continued as before, a large wine-glaſs full every hour.

We ſaw her again at nine in the evening. She remained tranquil—her jaws were leſs firmly cloſed, but the pain in her hand was not altogether removed. Although ſhe had taken the wine punctually as directed, it had not produced the

leaſt apparent excitement. Having had no diſcharge from her bowels for the laſt twenty-four hours, an injection was adminiſtered. The anodyne poultice was renewed; and, in addition to this application, we directed her arm to be bathed with laudanum occaſionally through the night.

Friday morning we found ſhe had paſſed a more comfortable night than the laſt; had taken her wine every hour; her jaws were perfectly relaxed; the pain in her hand had greatly abated, and ſhe was enabled to extend her fingers at pleaſure, which ſhe could not do before. Her pulſes and ſkin were natural; her appetite unimpaired; her mind compoſed, without any inconvenience from the wine. We directed her remedies to be all continued as before, fearing leaſt any alteration might ſubject her to a return of her complaints.

In the evening we obſerved the wine had exhilarated her ſpirits; ſhe became very talkative; her pulſes became full, and free from all tenſion; her ſkin was ſomewhat heated, and all complaints removed except the wound at the wriſt, which exhibited a healthy appearance, and was entirely free from pain, but without any ſign of ſuppuration.

We directed the wine to be adminiſtered through the night, but in ſmaller quantities and at longer intervals, unleſs her complaints ſhould return and demand a continuance of it as before.

Saturday morning we were informed ſhe had ſlept the greater part of the night, and had taken but a ſmall quantity of wine; her ſymptoms being, in all reſpects, favourable, the wine was diſcontinued, except a ſmall quantity mixed with nouriſhment. A dreſſing, of ſimple ointment, was applied to the wound. From that time ſhe remained free from any return of her complaints, and has ſince been in perfect health.

Upon calculating the quantity of wine which ſhe had taken, it amounted to three gallons.

ARTICLE V.

The following Remarks on the CONSTITUTION *of* NITROUS AIR *(Septic Gas) are from an anonymous Correſpondent, and addreſſed to Profeſſor* MITCHILL.

DEAR SIR, *Philadelphia, Jan.* 15, 1799.

THE ſubject to which I now wiſh to call your attention is one which, perhaps, has already engaged much of your time, but which, I hope, you will not heſitate to examine again. I mean the nature of that ſubſtance called nitrous air. As long ſince as the famous experiment of Mr. Cavendiſh on the formation of the nitrous acid, and thoſe of the French chemiſts, the nature and properties of nitrous air have remained in much obſcurity, and its relation to other ſubſtances has not been thoroughly examined. You will, therefore, pardon the liberty I aſſume in forwarding ſome hints towards the developement of this intereſting ſubject.

In what manner is nitrous air conſtituted? or what gives exiſtence to that elaſtic fluid which is generated during the action of the diluted nitric acid upon ſome metals? I anſwer, by a true *chemical union* of nitrogen gas with pure air; or, to ſpeak more definitely, the volatilization of thoſe two principles in their original *combined ſtate* in the acid, although in altered proportions to each other, by an addition of heat to them. The manner in which this ſeems to be produced, I will endeavour to explain briefly in the end. This particular union of theſe two elementary principles, forms an exceeding mild or weak nitrous acid. This we prove from the effect it produces upon ſome blue vegetable dyes in changing them to a red colour, as is aſſerted by M. Fourcroy. This, however, is not produced in a few days, as a conſiderable time is required to effect it. Nitrous air may then be ſaid to be of equal ſtrength with the common nitrous acid, diluted by water to that degree in which its ſour taſte is imperceptible, and in which it will ſtill redden a blue vegetable, in the ſame ſpace of time in which the air uſually does. This dilution will enfeeble and lower the powers of the nitrous acid very much indeed; yet ſtill I maintain the compariſon to be juſt; and what is

more, these two substances, the same in quality, differ only in form.

I would infer the union of nitrogen gas, and pure air in the composition of nitrous air, to be a *chemical one*, and of course the compound differing materially from the separate principles. *First*, from the fact, that a quantity of oxygenous gas, added to nitrous air, suddenly combines with it, by being absorbed by it, and forming the nitrous acid. This simple experiment favours the above idea with respect to the nature of the union of the component parts of nitrous air, in as much as all preternaturally weak acids have a strong tendency to combine with fresh oxygene, in order to acquire their natural strength. By the natural strength of an acid, I would mean that degree of acidity which it will always acquire when exposed, for a sufficient length of time, to a quantity of unadulterated atmospheric air. Thus the most highly concentrated acids are diminished, and such as contain little oxygene, united to large basis, are increased in their properties by exposure. This is amply evinced in the generality of the mineral acids, and in those of the vegetable kind.

Secondly. The opinion I have mentioned appears to be ably supported by the following consideration. The simple addition of pure air to nitrogen gas, even in the exact proportion in which they are said to form the nitrous air, will not afford a compound which possesses one of the properties of an acid, except it be the carbonic, which it resembles only in its aëriform property: for, were the case otherwise, we should always form the nitrous acid in our laboratories, and the atmosphere itself would be a substance of that nature. We, therefore, can say no more when we bring these two airs into contact, than that they are only in a state of mixture, and that no chemical union has ensued. But when we have recourse to some agents, we affect a more intimate union, and circumstances very different from these make their appearance. Thus, when the electric spark is made to pass through them, under certain proportions to each other, instead of the phenomena observed in merely adding the one to the other, as was just hinted, we behold, with astonishment, a complete change produced; and what we could have breathed before with impunity, and even with advantage, is now converted into a substance capable of corroding our flesh, and of dissolving some of the hardest metals—namely, the nitrous acid, or common *aqua fortis* of the shops. What are we to deduce from this wonder-

ful preſentation, but that, in the firſt inſtance, the airs were only *mixed*, and that, in the latter, they were thrown into a ſtate of *combination*, by the unknown power with which the electric matter was endowed—cauſing them to embrace each other more intimately, and by their mutual or ſuperior actions, to generate a diſtinct ſubſtance?

Thirdly. We deduce the preſent opinion from the two following experiments. 1. Take known quantities of nitrous air and oxygenous gas; add the latter to the former, and the nitrous acid will be immediately formed in red vapours, which are ſoon abſorbed, giving a diminution in the bulk of the air, exactly proportioned to the acid produced. 2. Add a quantity of pure air to a mixture of nitrogen gas and vital air, and no alteration will be produced, the bulk of the mixture being multiplied according to the pure air added, and the original tranſparency retained. Take even the ſame quantity of pure air which was uſed in the firſt experiment, and a quantity of nitrogen and oxygene gaſes, in bulk equal to the nitrous air, and proportioned to each other in which they form it; add theſe together, and you will not perceive any change take place. Now, in theſe two experiments we have eſſentially the ſame materials; yet how different is the reſult of the former from that of the latter! Had the affinity which ſubſiſted between the component parts of the one been the ſame with that between thoſe of the other, ſurely the ſame phenomena would have ſhown themſelves in both, as the ſame cauſes, under ſimilar circumſtances, invariably produce the ſame effects. As this great law in philoſophy was not exerted in theſe two experiments, we hence conclude, that the circumſtances in each were different, and that this difference conſiſted in that which is admitted in common acceptation by the terms *mixture* and *combination*.

Fourthly. We may infer that nitrous air differs materially from the ſimple mixture of pure air and nitrogen gas, its conſtituent principles, in as much as the one is much more abſorbed by water than the other. According to an experiment of Dr. Prieſtley, mentioned in his firſt volume, nineteen-twentieths of nitrous air were abſorbed by water which was previouſly well boiled. On the other hand, we know that pure air is very little or not at all abſorbed by water. In what manner nitrogen gas is abſorbed by water I am not qualified to determine; but, from experience I can aſſert, that atmoſpheric air was only abſorbed by boiled water one-ſeventh of

the whole quantity uſed. The experiment in which this was aſcertained, was continued about as long as that of Dr. Prieſtley, which was ſome time more than what is commonly conſumed in abſorbing fixed air by water. In this view of the ſubject you will obſerve a ſtriking difference.

Fifthly. We are at liberty to draw the above concluſion alſo from analogy. For inſtance, who will deny that the oxygenated muriatic acid gas depends entirely upon a combination of its component parts? If oxygene and hydrogene, according to Girtanner, compoſe the common muriatic acid, and this acid is converted into a ſuperoxygenated ſtate, from whence we procure the above mentioned gas, no perſon can aſſert, with truth on his ſide, that this ſame gas is only a mixture of its two principles; becauſe the oxygenated muriatic acid gas effervesces ſlightly with ammoniac, inflames the regulus of antimony, and ſeveral other metals under certain forms; whereas, in the ſimple mixture of oxygene and hydrogene, we obſerve no ſuch thing at all. We therefore ſay, that this oxygenated muriatic acid gas is merely a volatilization of a great quantity of oxygene, in an original combination with a ſmall quantity of the baſe of the acid from which we procure it; and, in this, we obſerve its analogy to nitrous air, whoſe conſtitution is ſupported by a combination of its parts, and, in this particular, differs from the ſame parts exiſting in a mixed ſtate. The ſame thing is applicable to the ſulphureous acid gas, &c.

Sixthly. Every chemiſt believing, that the nitrous acid depends upon ſome peculiar ſtate of its component principles, which ſtate is defined by the term *combination*, I will, in the laſt place, conclude the preſent opinion with reſpect to the nitrous air to be juſt, from the fact of volatilizing the nitrous acid, by means of a certain degree of heat, ſo as to afford as permanent gas ſimilar in every reſpect to nitrous air. Now, no chemiſt will aſſert, that the heat in this inſtance deſtroys the combination of the two principles of the acid.

Having gone thus far into the preſent ſubject, I will detain you a little longer in endeavouring to anſwer one or two objections to this doctrine I have attempted to prove. It is ſaid, that the nitrous air can be decompoſed in the ſame manner in which atmoſpheric air is, and that, therefore, the connection which ſubſiſts between the conſtituent principles of each, is the ſame in both. But this argues nothing, as the nitrous acid is decompoſed in the ſame way; and yet who will ſay the com-

ponent parts of this acid were not chemically united? And this circumſtance can be explained in no other way than upon the principle of elective attraction, in which it is ſaid, the oxygene of the acid has a greater affinity to the inflammable body than it had to the nitrogene, which it forſook in order to form a new compound. In like manner we obſerve, in the decompoſition of the nitrous air, the ſame attraction between its oxygene and the inflammable body deſtroying its exiſtence.

It is ſaid, moreover, that nitrous air cannot be an acid, becauſe it appears under the form of an elaſtic, inviſible fluid, differing materially on that account from the acid which afforded it. But this is no objection at all from what has been ſaid, as well as that fixed air is liable to the ſame diſpute, which no perſon now doubts of being a real acid. But I ſhall explain the cauſe of it thus: When the nitrous acid is decompoſed upon any metal, a great portion of its oxygene is ſeparated from it by a ſuperior affinity, which goes to calcine the metal, whilſt its nitrogene and the remaining oxygene are diſſipated in the form of air by the acceſſion of caloric to them. But this air ſtill retains its original ſtate, being only a volatilization of part of the acid, and the metal is more or leſs oxyded, according to a variety of circumſtances. Hence we ſee, that all the oxygene which is neceſſary to oxyde the metal will remain fixed in it, which is always different in quantity, in different metals, and even in the ſame metal at different times. This, at once, explains the cauſe of failure in the uſe of the eudiometer, in aſcertaining the exact degree of purity in air, which ariſes ſolely from the impoſſibility of obtaining nitrous air at different times of equal ſtrength; as the metal becomes oxyded, according to the degree of heat applied, as likewiſe to the ſpecific gravity of the air induced, and alſo to the nature of the metal uſed. I ſubſcribe, with pleaſure, your humble ſervant, &c.

☞ *Future Communications from this gentleman will be very acceptable to the Editors.*

ARTICLE VI.

A MEDICAL CASE, *drawn up by Mr.* BERRINGTON, *of Great-Britain: Communicated by Dr.* PRIESTLEY, *in a Letter dated Northumberland, January* 10, 1799.

A LADY having received her linen from the waſh, as ſoon as ſhe made uſe of it, perceived from it a diſagreeable ſmell, and ſomething that ſeemed to get into her ſtomach, affecting the ſtomach and throat very unpleaſantly: ſhe continued to put on other things, the ſame effects following; and, on the ſecond or third night, ſhe experienced, after being in bed a ſhort time, a great ſhivering, which was followed by a profuſe ſweat that laſted till morning. Her throat, from this time, became dry, her lips parched, attended by a ſmall ſwelling in the glands of the throat; when ſhe drank any thing ſtronger than water, it cauſed an immediate burning in the ſtomach; and, at intervals, ſhe had the taſte of braſs, followed by a diſcharge of water from her mouth. It was now thought proper to have every article again waſhed; but they returned in the ſame ſtate of infection, producing, in the ſame degree, the ſame effects as they came in contact with the body. The linen was then expoſed to the air, night and day, during a whole week in the month of February laſt, when the froſt every night was ſevere, and the heat of the ſun every day was great; ſtill the diſagreeable ſmell continued. It was next buried, during ſome days, in the earth, but no ſenſible change ſeemed to be made, the lady, from what ſhe had before worn, continuing to experience the ſame night ſweats, and all the other effects, which were always ſtrongeſt when in bed, and when ſhe approached the fire. Recourſe was had to medical aid, but without effect, and the waſherwoman and all the waſhing ingredients and veſſels were examined without diſcovering any thing: ſhe had before waſhed for the ſame lady, and ſhe continued to waſh for other perſons, and no complaints were made.

A young woman ſervant in the family, in perfect health, of a conſtitution apparently quite different from that of the lady, was now eaſily induced to put on ſome of the linen, after it had been more than once waſhed, and ſubmitted to the

proceſs above-mentioned. The firſt thing ſhe tried was a neckerchief; when, immediately, ſhe had the ſame ſenſations in her throat and ſtomach, increaſing the nearer ſhe went to the fire; ſhe then boldly put on a ſhift (which the lady had never done but once for about half an hour), and went to bed. Her ſenſations during the night were exceſſive, being the ſame, in a much ſtronger degree, as thoſe already deſcribed; however, the young woman perſevered, and twice more ſlept in the ſame infected coverings: ſhe was now fairly in for it; every night ſhe experienced moſt copious ſweats, ſhiverings, and burnings at the ſtomach; and, during the day, the dryneſs in the throat, ſwelling about the glands, parched lips, a perpetual thirſt, with an inability, without cauſing an immediate burning in her ſtomach, to ſwallow any thing but water, and a conſtant head-ache, or, as ſhe deſcribed it, an inceſſant painful preſſure over the eye-brows. As the weather became warmer, all theſe ſenſations and effects became more evident, and, after the lapſe of four months, the young woman thus deſcribes herſelf: At night ſhe has the ſame burnings and ſweats; by day, at certain intervals of three or four hours, ſhe feels a burning at her ſtomach, which is followed by a braſſy taſte in her mouth, that goes off with a copious diſcharge of clear water. The warmer the day, the more frequent and ſtrong theſe returns are; but the moment ſhe expoſes herſelf to the ſun, the internal burning comes on and continues, relieved, however, by every cloud that intercepts the ſun's rays. On the 10th of June ſhe deſcribed to me this to be her ſtate.

I muſt obſerve, that during the whole proceſs neither the lady nor the young woman, though ſo diſagreeably affected, experienced any loſs of appetite or diminution of bodily ſtrength, nor did the pulſe indicate any fever.

The lady, who was on a viſit, finding it impoſſible to get out of the infection (which was communicated from one thing to another by contact) returned to her own home, but ſhe left behind her a copious maſs of contagious matter in the towels and ſheets ſhe had made uſe of; and theſe, it ſeems, have propagated the evil. The linen alſo which the young woman wears, or ſleeps in, by receiving infection from her body, keeps up and ſpreads the evil. A few weeks ago, I myſelf receiving a hand towel, ſmelt in it ſomething diſagreeable, which the young woman immediately explained to be the infallible ſymptom of the preſence of the evil. Before this, I had never been able to diſtinguiſh the ſmell ſo much complained of. I uſed the towel,

however; and, by way of experiment on myſelf, rubbed my arms and neck more than uſual. In the courſe of the day I felt myſelf unpleaſantly affected, at night ſweated much more than common, and the next morning roſe with a great dryneſs in the throat, accompanied by thirſt and the painful preſſure over my eyes. It went off, but I repeated the ſame experiment twice with other towels, and experienced preciſely the ſame effects.

The fact, however extraordinary it may ſeem, being thus aſcertained by a ſeries of effects in three different perſons, during the lapſe of four months, and ſtill continuing, the queſtion to be reſolved is, What ſubſtance, animal, vegetable, or mineral, is there that can, in the manner above deſcribed, attach itſelf to linen, and through it produce ſuch powerful effects on the human body, and not be itſelf removable from the linen by the common means of waſhing, or the other means that were made uſe of?

June 20, 1798.

ARTICLE VII.

On the EXPANSION *of* WATER *during* CONGELATION: *Communicated in a Letter from* STEPHEN DICKSON, *M. D. to Dr.* MITCHILL.

IT is well known, that water, in the act of freezing, expands with conſiderable force. By calculations inſtituted on ſome experiments of the Florentine academicians, this force appears to be ſo great, as, in a ſpherule of water, only one inch in diameter, to be ſuperior to a reſiſtance of thirteen tons and an half.

Some ingenious experiments on this ſubject were made, a few years ago, in Quebec, during a very cold ſeaſon, by Major Williams. He expoſed to intenſe cold, water encloſed in an iron bomb-ſhell: the fuze was expelled to a conſiderable diſtance, and a cylinder of cryſtallized ice was ſhot forth from the aperture, which, by Dr. Hutton's calculation,* in

* Tranſ. R. Soc. Edin. vol. ii.

one inſtance, amounted to upwards of an eighteenth part of its original bulk.

The philoſopher who obſerves that this is not the uniform effort of ſpecific particles mutually receding from one another, ſince the ſpecific gravity of ice is greater than that of water, naturally inquires to what cauſe it is to be attributed. None ſeems to have a greater appearance of veriſimilitude than the ſuggeſtion of Dr. Black; viz. that, in the moment of the converſion of water into ice, the latent heat ſet looſe enters into the air contiguous to, or combined with the water, and expands it with ſuch vehemence as to effect the divarication of the ice into irregular maſſes, and the exploſion of reſiſting bodies. This explanation is countenanced by a minuter attention to the experiments to which it is applied; for we find that ordinary rain-water was employed, and even that the bomb-ſhells were but "nearly filled."

To put the inquiry, however, to a more rigid teſt, I procured two exactly equal and ſimilar cylinders of tin, cloſed at the extremities, except by a ſmall pipe in each iſſuing from the upper ſurface. One of theſe I filled with pure but ordinary rain-water; the other with water which I had carefully diſtilled. The apertures of both were cloſed alike by well fitted plugs of wood, which I had previouſly boiled in oil. I expoſed them to the open air, on the ſurface of the ſnow, in Quebec, the night of the 5th of January, 1799, when the thermometer ſtood at 28 degrees below zero of Fahrenheit's ſcale. About twenty minutes afterwards I found both the cylinders inclining to the horizon at an angle of about thirteen degrees, being ſo far rent from their baſes, which yet reſted on the ſnow. The intermediate ſpace in each was filled with rude maſſes of ice, which, on being examined with the microſcope (in a room), appeared to be compoſed of cryſtals, chiefly in the form of parallelopipeds and truncated pyramids. The whole of the appearances, in both caſes, were exactly ſimilar. I afterwards repeated theſe experiments, without any variety in the reſult.

From hence we perceive, evidently, that Dr. Black's ſolution is inadequate to account for theſe remarkable phenomena. At the ſame time I think it impoſſible not to admit the original principles upon which his ingenious rationale reſts. It is impoſſible that water can be converted into ice without the evolution of one-tenth of the whole quantity of its ſpecific fire, which is equal to 146 degrees of Fahrenheit's thermometer.

Now we know that water can be converted into vapour, under particular circumſtances, by much inferior temperature.—*Quere.* Muſt not part of the water have been converted into vapour in the very proceſs of congelation; and may not this cauſe be adequate to the production of the moſt violent expanſive force of froſt?

Quebec, January 24, 1799.

ARTICLE VIII.

OBSERVATIONS *on* METEOROLOGICAL INSTRUMENTS, *and on the* WEATHER *at Londonderry, in the Year* 1797. *By* WILLIAM PATTERSON, *M. D. Communicated in a Letter to Dr.* MILLER.

JANUARY.

BArometer	higheſt	30.53	9th. wind S. eaſy breeze, fair.
	loweſt	24.25	13th. wind variable, rain.
Thermometer	higheſt	48.	20th. wind W. moderate, fair.
	loweſt	36.	15th. wind fair, and froſt.
Hygrometer	higheſt	50¾	20th.
	loweſt	46½	10th. wind E. moderate, fair, but ſnow.

Rain 2 inches .364,585 parts.

FEBRUARY.

Barometer	higheſt	30.43	9th. wind S. eaſy breeze, fair.
	loweſt	29.55	14th. wind N. W. freſh breeze, rain, ſnow and hail.
Thermometer	higheſt	52.	22d. wind S. eaſy breeze, fair, bright and warm.
	loweſt	35.	15th. wind N. moderate, rain and froſt.
Hygrometer	higheſt	50.	9th.
	loweſt	35¼	16th. wind W. eaſy breeze, fair.

Rain 0 inches .827,585 parts.

MARCH.

Barometer	higheſt	30.38	21ſt. wind S. E. eaſy breeze, fair, hazy.
	loweſt	29.38	26th. wind variable, ſhowery.

Thermometer	higheſt	52.	31ſt. wind W. eaſy breeze, do.
	loweſt	36½	13th. wind N. eaſy breeze, fair, froſt and hazy.
Hygrometer	higheſt	44¾	24th. wind S. E. moderate, wet
	loweſt	36.	29th. wind W. eaſy breeze, rain.

Rain 2 inches .114,957 parts.

APRIL.

Barometer	higheſt	30.28	9th. wind N. E. freſh breeze, fair.
	loweſt	29.30	2d. wind N. W. moderate, ſhowery
Thermometer	higheſt	55.	24th. wind W. freſh breeze, do.
	loweſt	42.	2d.
Hygrometer	higheſt	41½	12th. wind S. W. moderate, rain.
	loweſt	27.	20th. wind E. freſh breeze, fair and bright.

Rain 1 inch .353,061 parts.

MAY.

Barometer	higheſt	30.18	9th. wind E. freſh breeeze, fair and bright.
	loweſt	29.24	4th. wind W. moderate, wet day.
Thermometer	higheſt	68.	25th. wind S. and S. W. moderate, ſhowery.
	loweſt	45.	12th. wind N. E. moderate, rain.
Hygrometer	higheſt	33⅔	5th. wind N. W. freſh breeze, rain and hail.
	loweſt	25⅓	25th.

Rain 3 inches .087,090 parts.

JUNE.

Barometer	higheſt	30.14	26th. wind N. moderate, fair and bright.
	loweſt	29.62	3d. wind N. W. freſh breeze, ſhowery and hail.
Thermometer	higheſt	60.	25th. wind N. E. freſh breeze, fair, and bright.
	loweſt	51.	3d.
Hygrometer	higheſt	35.	22d. wind N. E. moderate, ſhowers.
	loweſt	27.	29th. wind N. freſh, breeze, fair.

Rain 1 inch .418,751 parts.

JULY.

Barometer	higheſt	30.23	9th. wind W. eaſy breeze, little rain.
	loweſt	29.54	6th. wind N. W. moderate, ſhowers.

Thermometer	higheſt	72.	16th. wind S. moderate, fair.
	loweſt	58.	6th.
Hygrometer	higheſt	34⅓	8th. wind N. W. eaſy breeze, rain.
	loweſt	30.	13th. wind S. W. freſh breeze, do.

Rain 2 inches .417,105 parts.

AUGUST.

Barometer	higheſt	30.14.	22d. wind W. eaſy breeze, rain.
	loweſt	29.38	8th. wind S. W. eaſy breeze, do.
Thermometer	higheſt	64.	19th. wind W. moderate breeze, ſhowers.
	loweſt	50.	18th. wind S. E. freſh breeze, rain.
Hygrometer	higheſt	35.	9th. wind S. W. eaſy breeze, ſhowers.
	loweſt	33¼	22d.

Rain 3 inches .651,957 parts.

SEPTEMBER.

Barometer	higheſt	30.8	4th. wind W. by S. eaſy breeze, ſhowery.
	loweſt.	29.22	20th. wind N. W. moderate, do.
Thermometer	higheſt	58.	27th. wind S. moderate breeze, fair but hazy.
	loweſt	50.	21ſt. wind N. W. moderate breeze, ſhowery.
Hygrometer	higheſt	36⅓	21ſt. wind N. W. do. do.
	loweſt	33½	4th.

Rain 4 inches .256,255 parts.

OCTOBER.

Barometer	higheſt	30.37	10th. wind N. W. moderate, rain.
	loweſt	29.44	18th. wind W. by N. moderate, much rain.
Thermometer	higheſt	51.	10th.
	loweſt	42.	4th. wind N. E. moderate, wet, and hail.
Hygrometer	higheſt	37½	4th.
	loweſt	35⅔	19th. wind N. moderate, rain, and hail.

Rain 3 inches .822,726 parts.

NOVEMBER.

Barometer	higheſt	30.39	16th. wind W. moderate, ſome rain.
	loweſt	29.44	30th. wind S. E. moderate, ſnow, and rain.

Thermometer	higheſt	54.	10th. wind S. E. calm, fair, and froſt.
	loweſt	30.	24th. wind S.E. eaſy breeze, fair and froſt.
Hygrometer	higheſt	38½	30th.
	loweſt	35.	10th.

DECEMBER.

Barometer	higheſt	30.40	27th. wind W. moderate breeze, ſhowers.
	loweſt	28.80	1ſt. wind S. E. rain, and ſnow.
Thermometer	higheſt	46.	18th. wind S. freſh breeze, rain.
	loweſt	33½	3d. wind W. eaſy breeze, fair and froſt.
Hygrometer	higheſt	41¼	27th.
	loweſt	38½	3d.

November and December. Rain 5 inches .5,172 parts.
Total rain 30 inches .821,272 parts, in 1797.

The barometer, which is an upright one, with a floating gauge and a Nonius ſcale, is ſuſpended in an apartment in an upper ſtory, where fires are very ſeldom burned; the thermometer is one on Fahrenheit's ſcale; the hygrometer is made according to De Luc's plan, with a very thin ſtrip of tranſverſe whalebone, which moves an index round a circular plate, graduated to one hundred; the higher number indicating the greater degree of moiſtneſs of the air. With this hygrometer, I have obſerved eight years; and the obſervations are the more valuable, as being made with a comparable inſtrument. The thermometer and hygrometer, for the moſt part, are ſtationed in a lever-boarded window, which fronts the north-eaſt, and which is ſhaded on the outſide by a deal-board frame. The obſervations, when made twice a day, are made chiefly at 9 A. M. and at 3 P. M.; frequently they are made only once a day, and this ſometimes in the morning, and ſometimes in the evening, juſt as profeſſional avocations will admit; but, upon the whole, they are made ſo often as to aſcertain the temperature of the place pretty accurately, and the other ſtates of the air, viz. its weight and dryneſs, with ſtill greater exactneſs.

The rain-gauge is on a very ſimple conſtruction, conſiſting of nothing more than a funnel and a receiver. The funnel is made of tin; and its aperture contains an area of one hundred and forty-four ſquare inches. To the edge of the fun-

nel is foldered a perpendicular rim, an inch broad, and of the ſame area as the aperture at the edge. The water collected in the receiver is generally meaſured once a month, in pounds troy, which are reduced to cubic inches without the trouble of figures, by looking at a table, formed for the purpoſe by Mr. Kirwan, and publiſhed in the 5th vol. of Tranſact. Iriſh Academy.

The wind is obſerved by means of a vane attached to the cupola of our Exchange, which is ſituated in the centre of the city, in an elevated ſituation.

Account of the Weather at Londonderry in the Year 1797.

Months.	Prevailing winds.	Fair days.	Showery.	Wet.	Total.	Hail.	Snow.	Froſt.	Lunar Halo.	Aur. Borea.	Thunder.
January,	W.	12	17	2	31	0	2	6	1	0	0
February,	S.	18	10	0	28	2	2	6	0	0	0
March,	S.E.	16	13	2	31	1	0	3	0	1	0
April,	W.	13	14	3	30	3	1	0	0	1	0
May,	S.	8	16	7	31	6	0	0	0	0	0
June,	N.W.	14	16	0	30	1	0	0	0	0	1
July,	S.W.	3	28	0	31	0	0	0	0	0	0
Auguſt,	W.	5	26	0	31	0	0	0	0	0	1
September,	S.W.	3	24	3	30	2	0	2	0	0	2
October,	N.W.	7	19	5	31	6	2	2	0	0	0
November,	S.E.	9	12	9	31	2	4	7	1	0	0
December,	W.	6	21	4	31	5	2	6	0	1	1
Total.	W.	114	216	35	365	28	13	32*	2	3	5
1796.	W.	148	169	49	366	26	18	38	3	4	7
1795.	N.W.	131	198	36	365	18	33	60	4	3	8
1794.	W.	116	210	39	365	31	18	19	7	3	5
1793.	W.	128	178	59	365	19	12	30	6	3	8

REMARKS.

The temperature of January was in general moderate, and the weather fair; but a few freſh breezes came from the weſt and ſouth; and there was ſome ſmart froſt.—February was a remarkably fine, dry, warm month, as the froſt, ſnow and winds, were neither ſevere nor frequent; the firſt being chiefly

* Of the thirty-two froſty days eleven were hoar or white froſt.

of the hoar kind, the ſecond ſlight, and the third ſeldom high. The barometer was unuſually high the whole month, conſidering the ſeaſon (winter), and the prevalent direction of the wind (ſouth). Though the atmoſphere was often hazy, and ſometimes foggy in March, yet there was a good deal of fair, bright, but cold weather; and the freſh gales that happened were in the beginning of the month.—April, as well as the preceding months, was dry, and, generally, bright and temperate.—The beginning of May was cold, with ſeveral hail ſhowers; and, in general, there was a good deal of rain, together with ſome freſh breezes; but the greater part of the month was warm, and the winds ſoft and moderate.—Some mornings of hoar froſt occurred in June; and it was rather a cold month, with frequent ſhowers; yet the quantity of rain was not much; and the greater part of the winds were moderate.—Though there were few days entirely fair in July, yet there were not any entirely wet; the rain having fallen in ſhowers, generally heavy, ſometimes mizzling, but often with conſiderably fair intervals. The temperature of the air was ſoft and warm; and the winds were principally gentle.—The character of Auguſt, in reſpect to fair and rainy days, as well as to the winds, was nearly the ſame as the preceding month; but the ſhowers were in general heavier, whilſt the heat was not ſo great. In this month the electricity of the atmoſphere was ſometimes largely collected, and powerfully active. The 11th, about 12 o'clock at night, a body of atmoſpherical fire, which appeared to have a globular form, paſſed over this city with a loud, awful, rumbling noiſe, and, as it rolled, it diffuſed an extraordinary and extenſive illumination in the air. Its direction was from weſt to eaſt; and it is ſuppoſed to have dropped into the Iriſh Channel, as a meteor of this deſcription was ſeen falling there, by a gentleman croſſing to this country, and who arrived here two days afterwards. On the 29th of this month alſo we had a violent thunder ſtorm, remarkable for the extenſion and denſity of the lightning, and the loud pealing of the thunder.—September was a wet, unpleaſant, blowing month, with ſome loud thunder, and very heavy hail, ſo heavy that ſeveral panes of glaſs were broken in the windows of a houſe a few miles to the N. W. of this city.—October was a rigorous month, having much cold, bluſtry, wet weather, and ſnow from two to four inches deep ſo early in the year as the 19th, which is unuſual in this country.—In November ſome ſtrong gales of wind occurred at night, with a good deal of ſnow, and at

times heavy rain; the freezing was ſevere, but not long, and it was generally attended with fogs; yet once or twice the fog was accompanied with a ſenſible warmth.—There were ſeveral freſh breezes in December, and a ſevere gale from the ſouth-eaſt the night of the 11th, attended with thunder, rain, ſnow and hail; ſome miſts and fogs occurred; and it rained ſeveral times, though the Barometer ſtood high.

Although this year appeared wet, yet a leſs quantity (not thirty-one cubic inches) of rain fell than in ſome preceding years that were thought drier; which is explained by obſerving, that five months in the firſt half year, were particularly fair, and the moſt rain fell in the hay and harveſt months, when the public mind is naturally intereſted in the event, and conſequently would characterize the year according to the nature of the weather at thoſe times.

Obſervations on Meteorological Inſtruments, and on the Weather at Londonderry the three firſt Months of the Year 1798.

Months.	Prevailing winds.	Fair.	Showery.	Wet.	Hail.	Snow.	Froſt.	Lunar Halo.	Aur. Boreal.	Thunder and Lightning
January,	W.	7	20	4	5	2	5	0	0	0
February,	W.	12	12	4	3	5	7	0	1	0
March,	N W.	12	19	0	7	2	2	1	0	0
Total,	W.	31	51	8	15	9	14	1	1	0

GENERAL REMARKS.

January was a wet month; the rain fell chiefly in heavy ſhowers, frequently at night, accompanied with ſeveral freſh gales of wind, which blew principally from the S. W. February was, in general, a fine winter month; the firſt fortnight was remarkably mild, but ſome heavy fogs occurred, and the ſky was frequently covered. After the middle of the month the froſt and ſnow came on, but were not to be reckoned ſevere, and the rain that fell was moſtly in ſlight ſhowers: the winds were for the moſt part moderate; the freſh breezes that happened were neither frequent nor harſh.—The weather in March was in general cold, but not rigorouſly ſo; the winds were principally moderate; and the rain fell chiefly in rather ſmall ſhowers.

Obſervations on Meteorological Inſtruments.

JANUARY.

Barometer	higheſt	30.40	25th. wind E. moderate, fair.
	loweſt	28.84	31ſt. wind W. moderate, rain, ſnow, froſt, and hail.
Thermometer	higheſt	44½	22d. wind W. by N. freſh breeze, ſhowers.
	loweſt	33	31ſt.
Hygrometer	higheſt	43½	28th. wind S. W. freſh breeze, ſhowers.
	loweſt	40¾	2d. wind W. moderate, rain.

Rain 4 inches .532,120 parts.

FEBRUARY.

Barometer	higheſt	30.68	8th. wind W. eaſy breeze, fair, but foggy.
	loweſt	29.17	22d. wind N. W. moderate ſome rain and ſnow.
Thermometer	higheſt	49½	14th. wind W. moderate, ſhowery.
	loweſt	35½	20th. wind N. W. moderate, rain, hail, ſnow and froſt.
Hygrometer	higheſt	44⅘	14th.
	loweſt	42.	17th. wind N.W. freſh breeze, fair, ſnow, hail and froſt.

Rain 1 inch .852,257 parts.

MARCH.

Barometer	higheſt	30.33	23d. wind N. E. moderate, a little rain.
	loweſt	29.64	16th. wind N.W. ſqually breeze, rain and hail.
Thermometer	higheſt	53.	2d. wind S. W. moderate, ſome rain.
	loweſt	37½	10th. wind N. E. moderate, fair, and hail.
Hygrometer	higheſt	44.	2d.
	loweſt	37.	22d. wind N. E. moderate, fair, hail and froſt.

Rain 1 inch .8,911,668 parts.

The city of Derry, where theſe obſervations were made, is ſituated in latitude 55° N. and longitude 7° 40′ W. and ſtands on a promontorial tongue of land, elevated about one hundred feet above the level of the ſea, ſtretching obliquely from weſt to north-eaſt, and terminated with a moderate declination in

a ſhore waſhed by a conſiderable river, called the Foyle. This river, about three miles below the city, dilates into an extenſive eſtuary, which communicates with the northern ſea, from whence the town is diſtant about twenty miles. The depth of the river, oppoſite the town, at low water, is thirty-one feet, and the riſe of the tide is from eight to ten feet, flowing ſeveral miles farther into the country.

From weſt to north-weſt, the town is overtopped by a range of high lands, which are, in a great meaſure, clothed with heath and turf-bog. To the ſouth and eaſt, it is alſo covered by riſing grounds, that are for the moſt part tilled, or fit for tillage. The neareſt mountain is three or four miles to the north-weſt; and many conſiderable ones, at different diſtances, appear from ſouth to north. A hill of ſome note, but comparatively inconſiderable, is ſituated about two miles weſt of the town, ſhowing its ſummit a little above the altitude of the adjacent riſing grounds.

Few trees, or plantations of trees, are in the city, or its vicinage; at leaſt they are not ſo numerous as to be ſuppoſed capable of materially affecting the ſtate of the ſurrounding atmoſphere; nor are there any moraſſes, or ſtagnant pools of water, which can be charged with having any particular influence in this reſpect.

The ground on which the city is built, conſiſts of a maſs of common quarry ſtones, in many ſpots partaking of a flaty texture, covered by a ſtratum of clay from three to ten feet in thickneſs. The mean yearly temperature of the ſoil, as deduced from trials made on the water of deep cloſe wells, when at its maximum and minimum of heat, is found to be from 47 deg. 6 min. to 49 deg. which differs very little, in the average, from the mean annual temperature of the place, viz. about 46 deg. nor from the mean annual temperature of the ſtandard ſituation of the latitude, that is, 48 deg. 4 min.

The form of the town is an oblong quadrilateral figure, extending lengthwiſe S. E. and N. W. or a diagonal, drawn from the Cathedral, through the Exchange, to the Magazine, would be nearly on a N. and S. line. Four gates, viz. Biſhop's Gate, Ship-quay Gate, Ferry-quay Gate, and Butcher's Gate, open into four ſtreets, which are named after their reſpective gates, and terminate in a ſquare, called the Diamond, where the Exchange is placed. The firſt gate faces the S. W. and the ſecond is oppoſite to it; the third looks to the S. E. and over againſt it is the fourth. The length of the town, reckon-

ing from Bishop's Gate to Ship-quay Gate, where it is longeſt, is about 1500 feet; and the breadth, from Ferry-quay Gate to Butcher's Gate, where it is broadeſt, is about 900 feet.

This city is ſurrounded by a wall, which is, in general, above twenty feet broad; but the outſide wall of ſtone, or the battlements, is not more than two feet in thickneſs. The broadneſs of the inſide wall renders it a pleaſant terrace-walk, now carried over the gates by arches, and from which the eye is agreeably intereſted with ſeveral good picturesque views, although little aided by planting. The views, however, are in general fine; ſo much ſo, that, in the opinion of Mr. Young, the famous Engliſh touriſt, "the ſcene wants nothing but wood to make it a perfect landſcape." This want is daily ſupplying, as ſeveral improvements in building country-ſeats, in improving, dreſſing and planting grounds, have taken place ſince the year 1776, the time in which Mr. Young was in this part of the country. Beſides miniſtering to theſe pleaſing proſpects, this circumjacent platform, which ſerves the inhabitants for air, exerciſe and recreation, conſpires largely with the rectangular poſition and general openneſs of the ſtreets, to maintain a ſalutary ventilation. The number of inhabitants is computed to amount to eleven thouſand nine hundred, reckoning the houſes at ſeventeen hundred, and allowing ſeven perſons to each houſe; which, conſidering the common population of our towns, is rather a moderate rate of calculation.

With reſpect to victuals, and other neceſſaries of life in uſe amongſt the inhabitants, they may be judged of by the following principal circumſtances: the upper claſs lives in that manner, as to meat and drink, which may be termed a generous temperance; they do not, in general, eat animal food more than once a day, for dinner; not commonly, of courſe, for ſupper, and never for breakfaſt. The middle claſs lives proportionably comfortable as the upper, and on nearly ſimilar articles of diet at the ſame meals. The loweſt claſſes ſubſiſt chiefly on vegetable aliment, of which, potatoes here, as well as throughout the kingdom, form the greateſt part. The cloathing of theſe poor people is but bad, many going almoſt conſtantly barefoot; and numbers are but ſcantily ſupplied with firing in winter.

The pump-water within the walls, and that on the outſide near the river, is hard and brackiſh; the former quality, which prevails as the pumps recede from the river, is conſidered to proceed chiefly from the incorporation of ſulphat of lime (ſe-

lenites), and the latter principally from that of muriat of ſoda (marine ſalt). But, in ſome parts of the ſuburbs and their vicinity, there are ſeveral ſprings of pure ſoft water, which is that uſed for drinking and ſimilar dietetic purpoſes; the hard water being only employed on the coarſer culinary and domeſtic occaſions.

[*Dr.* PATTERSON'S *account of the diſeaſes prevalent at Londonderry in the years* 1797 *and* 1798, *ſhall appear in our next number.*]

ARTICLE IX.

An Account of the Situation and Diſeaſes of La Vera Cruz; being an Abſtract of two Letters from RICHARD V. W. THORNE, *Surgeon of an American armed Ship, dated reſpectively at La Vera Cruz, on the 7th of March and the* 13*th of April,* 1799, *addreſſed to Dr.* MITCHILL.

MR. THORNE arrived at La Vera Cruz on the 6th of March, 1799. He deſcribes the city as ſituated in Mexico, or New Spain, in the province of Tlaſcala, on the ſide of the Gulf of Mexico, in N. lat. 19, 12, W. long. 97, 30, and about two hundred and fifteen miles S. E. of the city of Mexico. The ſoil on which Vera Cruz is built, is low, level, ſandy, and ſo remarkably barren that a green thing is ſcarcely to be ſeen in the neighbourhood of the town. The houſes are built of limeſtone, procured from the bay: white-waſhing is uſed inſtead of paint; but this has been ſo long neglected that the buildings now ſhow all the marks of age and decay. The town extends from eaſt to weſt, is about one mile and three quarters in circumference, and is ſurrounded by a ſtone wall, which, however, in many places, is rendered nearly uſeleſs by the accumulation of ſand almoſt to the top. The houſes are large and airy; but from the low ſituation of the place, and the poſition of an adjacent hill of ſand ſtretching from the N. W. to the S. E. the air is greatly confined, and inſide of the wall has little circulation. During the north winds, which often do much damage in this place, by reaſon of its expoſure on that quarter, the motion of the air, in the central parts of the town, is but little increaſed. From this, one may readily judge of the con-

finement of the air, and how liable the town muſt be to the production of infectious exhalations.

Vera Cruz is the grand port of New-Spain; the harbour is excellent, and is naturally defended by rocks. From this port the wealth of Mexico is tranſmitted to Europe, and here the neceſſaries and luxuries of European manufacture are received in return. Its trade may be reputed nearly equal to all the commerce of South-America. Its population is eſtimated at about five thouſand.

Mr. Thorne gives an unfavourable account of the cleanlineſs, as well as of the ventilation of Vera Cruz. In walking through the ſtreets, perſons are often offended by very ill ſmells. Not only excremental matters of the inhabitants are often ſuffered to remain in the ſtreets, but thoſe of numerous domeſtic animals, ſuch as horſes, mules, ſheep, &c. carried by rains, and by the deſcent of the pavements, into the middle of the ſtreets, and there mixed with ſtagnant waters, with the addition of the putrefying carcaſes of horſes, mules, dogs, cats, &c. All theſe things, acted upon by a warm ſun, often emit vapours ſo noiſome as to render the ſtreets ſcarcely paſſable, except by thoſe accuſtomed to them. Many receptacles of filth are allowed to accumulate large quantities of it in and about the houſes, which thus prove an additional ſource of offenſive and unhealthy exhalation.

Mr. Thorne viſited the King's Hoſpital at Vera Cruz. He deſcribes it as a large and lofty building, the wards ſpacious, and capable of accommodating one thouſand perſons. The preſent number of patients is from eight to nine hundred, who are all ſoldiers. From the phyſician of the hoſpital the following account of their common epidemic fever was received:

This diſeaſe moſt commonly attacks foreigners, ſuch as thoſe who come into town from the back parts of the country—the ſoldiers in particular, for they all come from Mexico, which is a fine climate. Theſe men are ſtout, healthy, well looking fellows. As for the natives of the place, who have lived here all their days, it is a very remarkable thing for one of them to be taken ſick with this diſeaſe. The ſoldiers eat great quantities of beef during the time they are allowed it, and are crowded together in great numbers in barracks. Their beef is very lean, and, of courſe, contains ſo much the more ſepton (azote); and often, at this time of the year (which is not near the warmeſt), it ſmells offenſively when brought from market. As the heat produces this effect now, what muſt it do during

the months of July, Auguſt, and September, in which time of the year there is ſo great havock made among theſe people? They generally are addicted to drinking great quantities of ſpirituous liquor whenever they can get it, and often lie in the open air during the night. This is a common practice with ſome, and ſeems to be a very injurious one, for the air is ſo very moiſt, that ſails, during the night, become as wet as if dipped in water. The poorer people live crowded together, and ſleep on damp earthen floors, with merely a mat under them: by theſe means they muſt be expoſed ſtill more to the effects of the principle of infection. The months of July, Auguſt, and September, are very wet; ſo much ſo, that they are called the rainy months, producing all the moiſture as well as heat neceſſary to haſten putrefaction. In ſhort, there is every thing here that is any way conducive to the production of fever.

The ſymptoms that generally attend this diſeaſe are the following, as related by the phyſician of the King's Hoſpital: The perſon is firſt attacked with pain in the head, back, loins, abdomen, and thighs, accompanied with fever, which ſometimes takes place at the firſt, and is very violent. The pain in the abdomen reſembles that of colic. Theſe continue three or four days. If no relief is afforded at the end of this time, vomiting comes on, unleſs a ſort of diarrhœa ſhall have taken place during the firſt two or three days, which being the caſe, the vomiting is prevented. But if a diarrhœa cannot be procured, the vomiting comes on, and is a very unfavourable ſymptom. The matter ejected is of a darkiſh colour, often reſembling coffee grounds, and tinctured with blood, which is a bad ſymptom. If the bowels have been coſtive, they now become looſe, and the excrement that paſſes off by ſtool is very fœtid and bloody. If the patient ſhould ſurvive ſome days, and the vomiting turn to be pure blood, and pure blood be alſo diſcharged by the anus, ears, eyes, any or all of theſe ways, it is a good ſymptom: or if a vomiting of blood takes place in the firſt ſtage, a favourable concluſion of the caſe is to be drawn. The moſt deſperate caſes are thoſe attended with bubos, which are not uncommon. The phyſicians do little in theſe caſes: they truſt principally to nature to ſtop the vomiting, as they know of no medicine that can produce this effect.

Their practice, as far as it extends, is ſimple and good. When thoſe pains take place in the inteſtines, they give gliſ-

mena are not exiſtences *per ſe*, but only accidents, ſymptoms or modifications of ſuch exiſtences as have life: and an arrangement of the diſeaſed appearances of the human body conſtitutes the *noſology of man*. Upon the ſame plan of proceeding there might be made out a noſology of every vegetable and every inſect, of every thing, in ſhort, which is animated, from the lord of the creation down to the moſs which he treads upon. The world would thus be filled with noſologies.

We ſuſpect there is a radical difficulty in all theſe noſological attempts, which it is impoſſible to remedy; and this is, that nature has not diſtinguiſhed ſymptom from ſymptom, in diſeaſes, with the ſame exactneſs by which plant differs from plant, or one animal or mineral varies from another; but, on the contrary, has interwoven the tiſſue of diſeaſes by threads which are inextricable, but by a more correct and ſcientific acquaintance *with their cauſes*. At preſent, not only the *claſſes*, *orders*, and *genera* in noſology, are, as in other caſes of ſyſtematizing, *contrivances of the human head*; but, in moſt of the examples they afford, the *ſpecies* and *varieties* are alſo: ſo that, really, noſology is little elſe than an arrangement of *words* and not of *things*. Perhaps, in the whole circle of human exertion there has not often been an expenditure of ſo much labour and talent to ſo little purpoſe. If there is any branch of knowledge to which *noſology* bears a near reſemblance, it is *heraldry*, where verbiage and nonſenſe have taken almoſt entire poſſeſſion of the field.

If any thing could reſcue noſology from the charge of frivolouſneſs, it is the ſpecimen lately exhibited by Dr. Darwin in Zoonomia. Relinquiſhing the viſionary and ſuperficial arrangements of his predeceſſors, this phyſician adopts four natural claſſes of diſeaſes, founded upon their proximate cauſes, and conſiſting of the different modes of morbid action of the four faculties of the ſenſorium, denominated thoſe of irritation, ſenſation, volition, and aſſociation. As the eſſential characteriſtic of a diſeaſe conſiſts in its proximate cauſe, the noſologiſt can find no other ground upon which he may ſo firmly reſt his claſſic character. Dr. Cullen ſeems to have been ſenſible of the importance of the proximate cauſe in the claſſification of diſeaſes, when he obſerves (Noſologia Methodica, tom. ii. Prolegom. p. 29), "*Similitudo quidem morborum in ſimilitudine cauſæ eorum proximæ, qualiſcunque ſit, reverâ conſiſtit.*"—Dr. Darwin takes the characters of the

orders from the exceſs, deficiency, retrograde action, or other properties of the proximate cauſe. The genus is generally derived from the proximate effect; and the ſpecies generally from the locality of the diſeaſe in the ſyſtem. The advantages of this method of claſſing diſeaſes, according to their proximate cauſes, over all preceding ſyſtems of noſology, ſeem to conſiſt in leading to a more diſtinct and thorough knowledge of the nature of diſeaſes, by a compariſon of their eſſential properties—in facilitating the knowledge of the methods of cure, by bringing together thoſe diſeaſes in a natural method of claſſification, which require ſimilar treatment—and in unfolding to phyſicians the nature and treatment of diſeaſes previouſly unknown, which will always be more readily effected by a natural than an artificial ſyſtem of claſſification.

The formulæ in this collection are various and numerous; and we cannot but remark on the prevailing neatneſs and elegance of preſcriptions among modern phyſicians. We hope ſimplicity will prevail much more in their *recipes*. The compound powder of ipecacuanha, commonly called *Dovar*'s powder, is an inſtance of this. Dr. T. directs it to be made thus: "Take of powdered ipecacuanha, and of purified opium, each one dram, of the ſulphate of potaſh one ounce, mix and rub them well together, until they ſhall have acquired the appearance of a homogeneous powder."—Dr. THOMAS DOVAR, who has left a little practical book, called "*The Ancient Phyſician's Legacy to his Country*," gave the receipt for this ſudorific "preſcription to eaſe the gout" thus: "Take opium one ounce, ſalt-petre and tartar vitriolated each four ounces, ipecacuanha one ounce, liquoriſh one ounce: put the ſalt-petre and tartar into a red-hot mortar, ſtirring them with a ſpoon until they have done flaming: then powder them very fine; after that ſlice in your opium; grind theſe to powder, and then mix the other powders with theſe. Doſe from forty to ſixty or ſeventy grains, in a glaſs of white-wine-poſſet, going to bed: covering up warm, and drinking a quart or three pints of the poſſet drink while ſweating."

A compariſon of the *new* with the *old* mode of preparing this excellent remedy will illuſtrate the greater exactneſs, neatneſs, and eaſe, of making the preſcription now in uſe.

This manual, which Dr. T. has offered to the public, may, we think, be of advantage to ſuch perſons as are not poſſeſſed of the originals: and we hope there will ariſe no objection to the performance becauſe it is written in Latin; for we

ters, every quarter or half an hour, of caſtor oil and water, as is commonly done, and order the patient to drink lemonade freely.

With reſpect to bleeding, this phyſician ſpoke but little in favour of it, and it is very ſeldom reſorted to; "but," ſaid he, "it depends on the habit of body of the patient: if he is of a robuſt conſtitution, bleeding may be uſed with ſervice; but we are afraid of drawing blood, becauſe the part from which it is drawn will have a greater quantity of blood carried to it, and the tendency to putrefaction of that part will be increaſed."

He mentioned ſeveral diſſections, in which the ſtomach and inteſtines were found in a putrid ſtate: the contents of the cranium had undergone no particular change.

After the viſit to the King's Hoſpital, Mr. Thorne made another to the City Hoſpital. The phyſician of this hoſpital was not in attendance at the time; but from what is reported of his practice, he has been very ſucceſsful. His practice (which he has adopted lately) is to bleed; and previous to this, and after it, he gives ice, lemonade, and applies ice externally to the abdomen, and uſes gliſters freely. This practice he has found to be ſucceſsful.

Cold bath and bliſters are aſſerted by this phyſician to be injurious. But if ſo, how (aſks Mr. Thorne) is the ice of ſervice? Reſpecting their opinion of the nature of the cauſe of this diſeaſe, little can be collected; but it is to be concluded they know very little about it. The medical gentlemen here meet, in a little time, to conſer on this point.

Of all the Americans who have been here, only three have been attacked with this complaint, and ſome of them have been here four months. Two of them lodged next door to a hoſpital, to which they attributed their diſeaſe: the third was on ſhore during the day, but ſlept on board of his veſſel. They all recovered.

Mr. Thorne ſtates that ſeveral of their men had been attacked with ſomething like this diſeaſe, but had recovered.

REVIEW.

ART. I. *Rapport fait aux Citoyens* Victor Hugues *et* Lebas, *Agens particuliers du Directoire Executif aux Iſles du Vent, par la Commiſſion etablie en vertu de leur Arrêté du* 12*eme Vendemiaire, l'an* 6*eme de la Republique (Oct.* 3, 1797), *pour examiner la Situation du* VOLCAN DE LA GUADALOUPE, *et les Effets de l'Eruption, qui a eu lieu dans la nuit du* 7 *et* 8 *du meme mois (Sept.* 28 *and* 29). *Port de la Liberté, Guadaloupe. 4to. pp.* 84. 1797.

THE Iſland of Guadaloupe was agitated by numerous ſhocks of earthquakes, and by a volcanic eruption, in the autumn of 1797. The apprehenſion and alarm of the inhabitants were ſo conſiderable, that it was judged proper, by the government, to appoint commiſſioners to inquire into the facts, and report publicly thereon. Accordingly *Victor Hugues* and *Lebas*, the agents of the French Directory for the Windward Iſlands at that time, appointed by their commiſſion, bearing date October 3, 1797, Citizens PEYNE, AMIC, LACHENAIE, FONTELLIAU, and CODE, to viſit the place where theſe ſubterranean commotions had happened, and to report what they ſhould diſcover concerning the qualities of the neighbouring atmoſphere, the productions of the different kingdoms of nature round about, the ſhape and ſtructure of the mountain, its elevation above the level of the ſea, the qualities of the waters guſhing out from its ſides, the ſubſtances diſcharged from its crater, and generally to give their opinion on every thing it exhibited of a nature intereſting to natural hiſtory or phyſical ſcience. The piece before us is the report which the commiſſioners made on that occaſion.

They conclude, from what they obſerved, that the mountain whence the eruption on Guadaloupe proper, or Baſſe-Terre, proceeded, is 4840 feet higher than the level of the ocean, that it has undergone great changes, and will probably undergo more; and that it has a communication or connection with the volcanos in the neighbouring iſlands, and, through them, with the burning mountains of Terra Firma.

They are alſo of opinion, that the change which the atmoſphere underwent from the eruption was chiefly owing to ſulphurated hydrogenous air, and ſulphureous acid gas, let looſe in large quantity (p. 45); that the injury done by them to animal life was more than compenſated, by the diſplacement and renewal of the atmoſpherical fluids in the iſland; that the ſpring waters were nearly the ſame *after* the eruption as *before* it; and that the damage done to plants was owing to the ſulphuric acid which corroded their leaves and ſtalks, and oftentimes killed them.

To give a more full conception of the ability with which this report is drawn up, we inſert the following extract from the deſcription of the Iſland of Guadaloupe (p. 2). "It is ſituated in lat. 16 deg. 4 min. N. and long. 64 deg. 30 min. W. from the meridian of Paris. This iſland, which is reckoned to be about eighty leagues in circumference, is of an irregular form, and ſeparated in two by a canal or creek, called the *Salt-River*. This canal, which is about two leagues long, is from fifteen to ſixteen fathoms wide. Its ſhallowneſs at its extremities or openings, which do not correſpond to the depth of the baſon or interior parts, prevents its being navigable by large veſſels. It is bordered by the *rhizophora* (mangle) of Jacquin, which grows in a drowned and muddy bottom, formed, in a good degree, of decayed parts of that vegetable; and there inceſſantly exhale from the place miaſmata of ſulphurated hydrogenous gas, which render the navigation diſagreeable and unhealthy. On one ſide of this canal is *Grande-Terre*; on the other, the part of the iſland which particularly bears the name of *Guadaloupe*.

"*Grande-Terre* is, in general, a flat country; one, however, finds, in ſome of its departments, hills conſiderably elevated. The ſtones which conſtitute the baſis of its ſoil, as well as the ſhells which compoſe the mountains, prove that it aroſe from the boſom of the ocean. Father *Labat* has ſaid, and the celebrated *Buffon* has repeated after him, in his *Theory of the Earth*—That *Grande-Terre, in ages paſt, was no more than an elevated bottom of calcareous plants (lithophyta), which having acquired conſiderable growth, and filled up the ſpaces between them formerly occupied by the water, have raiſed the ſoil above the level of the ſea, which, on withdrawing, has left the whole of the ſurface dry.* If theſe changes were thus effected, may we not conjecture, in our turn, that nature, in forming *Grande-Terre*, would have

obſerved a kind of ſymmetry, different from that which we actually find in the arrangement of the materials? To be convinced of it, one need but caſt a look at the ſlope of the hill of *La Victoire*, and all thoſe in that part of the iſland. Wherever there are excavations we find them conſtantly calcareous. One may obſerve the diſorder which exiſts in the remains of the ſhells which form their rocks. One may ſee that very heavy maſſes of ſtone lay upon ſtrata of earth conſiderably lighter than themſelves. In ſhort, one may behold that all things there appear to have been mixed, jumbled and huddled together by motions, occaſioned, no doubt, by violent ſhocks of earthquakes. The volcanic ſubſtances, which are every where here to be met with, give an air of probability to this conjecture," &c. "Theſe obſervations have led us to believe, that *Grande-Terre* is an iſland of ſecondary formation, while *Guadaloupe* is of the *primary* kind, and is, perhaps, a portion detached from the continent. In fact, Guadaloupe, ſtrictly ſpeaking, is a pile of high mountains, which ſtretch into a chain from S. S. E. to N. N. W. they ſhelve away toward the ſea, and leave, at their foot, plains as beautiful as productive. The body of theſe mountains, whoſe ſummits are often above the clouds, is formed of *granite*, more or leſs hard, and of a grey or reddiſh colour; of ſand of the ſame nature, and, like the granite, fuſible into a glaſs of a deep green, which ſtrikes fire with ſteel; and, laſtly, of an argillaceous earth, by an alteration in theſe granites and their ſand; an operation which we obſerve, on all ſides, going on under our eyes."

The commiſſioners deſcribe the proſpect from the peak of the mountain thus (p. 10): "From the extreme elevation of this rock there is a moſt aſtoniſhing proſpect. The obſerver has, at the ſame time, under his eyes, the ragged ſummit of the mountain, the cruſt, perpetually ſmoking, under which the furnace exiſts, which has ſeveral times burſt through it, and the rich country beneath, that has been ſeveral times buried under their ruins. And while thus we were taking a near ſurvey of nature in deſolation and decay, we beheld, at a diſtance, the moſt brilliant and animated face of a country, arrayed in the livelieſt colours. From this ſpot the hills below loſt their height; they ſunk, as it were, to enlarge the plain, and ſuffer *Les Saintes* to be ſeen, which did not appear larger than rocks on the ſides of *Trois Rivieres*. On the left we had *Deſeada*, *Marie-Galante*, and *Dominica*;

as well as *Montſerrat*, *Antigua*, *Nevis*, and *St. Kitts*. On the ſouth, *Martinique*, diſtinguiſhable, from a diſtance, like a cloud, terminated the view, low in the horizon."

This volcano was obſerved in 1493 by Columbus. There is no notice of it on record for 152 years afterwards, when, in 1645, it was ſeen and mentioned by Father DU TERTRE. In 1696 it was deſcribed by LABAT, and, ſince that time, viſited by PEYSONNEL. For about ſixty-two years prior to the eruption in 1797, it has, except once, given very little trouble or alarm.

One of the moſt remarkable circumſtances in the report is, that the earthquakes in Guadaloupe, and the other iſlands in the ſame chain and connection, have a correſpondence, both in time, duration and violence, with the volcanic eruptions and agitations of the continent of South-America; and that the ſubterranean diſturbances of the Antilles ariſe from the general cauſe which rocks Peru and Quito, and ſhakes the foundations of the Andes.

We cannot diſmiſs from conſideration this inſtructive report, without expreſſing our ſatisfaction at the promotion of ſcientific inveſtigations during the prevalence of war. Too commonly has it happened, that reſearches of a philoſophical kind have been altogether prohibited, or, at leaſt, ſuſpended, during the ſtrife of arms. It give us, therefore, the greater pleaſure, to ſee Mars lay aſide ſome portion of his ferocity, and learn leſſons of wiſdom from Minerva. The performance is very honourable both to thoſe who authorized and thoſe who effected it.

ART. II. *Vade-mecum Medicum, in duas Partes diviſum, quarum prior, Noſologiam Cullinæam, poſterior compendium Materiæ Medicæ et Pharmacopœiæ, exhibet, &c. &c. Auctore* Gulielmo Tazewell, *M D. Virginienſe. Lutet. Paris.* A. J. Dugour *et* Durand. *Philadelphia.* Dobſon. 1798. *ſmall* 8*vo. pp.* 210.

THE book to which this title-page is prefixed is written in modern medical Latin, and contains the arrangement and definitions of diſeaſes, taken, word for word, from Cullen's Noſology. One third of the book is occupied by this.

It contains likewiſe a pharmacopœia, divided into two parts; the former of which is a liſt of ſimples belonging to the Materia Medica, and the latter, of compounds and preparations to be kept in the ſhops, with directions for making ſome of them. Between the two is a catalogue of ſome of the more ſimple chemical preparations, with their French and Engliſh ſynonyma, according to the old phraſeology and to the new nomenclature. For theſe, and the receipts which are contained in the latter part of this collection, the compiler is indebted to the notes he took while attending the claſſes in Edinburgh, to the London Pharmacopœia, and to a work of Mr. Townſend's, which we ſuppoſe to be his "Guide to Health." Theſe occupy a little more than another third of the volume.

Dr. Tazewell next gives what is termed a *poſological table*, or an account of the quantities and doſes of remedies, not unlike that of Sir JOHN ELLIOT's *Medical Pocket-Book*; and afterwards arranges medicines into nineteen claſſes of ſialagogues, attenuants, demulcents, &c. according to the effects they are ſuppoſed to produce upon the human conſtitution; which we will not ſay are abridged from the complicated *Methodus Materiæ Medicæ* of Profeſſor HOME. At the end of the volume is an etymological index, ſhewing the derivations of ſome of the terms employed in medicine.

To give a regular review of this publication would be no leſs an undertaking than reviewing Cullen's Noſology, the London Pharmacopœia, and a Collection of Practical Formulæ; a taſk we decline to enter upon at large for the preſent. We may, however, make an obſervation or two upon Noſology in general. All of the attempts to arrange morbid affections have been exceedingly imperfect; and it is likely they will always remain ſo. Syſtematic modes of arranging *minerals*, *plants* and *animals*, have been adopted very advantageouſly; and natural hiſtory has been much benefited by them, becauſe each of theſe beings is ſuſceptible of a preciſe and appropriate deſcription. In theſe departments of knowledge, the *claſſes*, *orders*, and *genera*, are the *creatures of art*, but the *ſpecies* and *varieties* are the *productions of nature*. Mineralogy, botany, and zoology, in as much as they are collections of individual exiſtences in nature, are capable of being methodized and diſtributed into an orderly form. We very much doubt, however, whether *diſeaſes* have that appropriate and definite form which enables them to be claſſified like the foſſil, vegetable, and animal ſpecies. Morbid pheno-

mena are not exiſtences *per ſe*, but only accidents, ſymptoms or modifications of ſuch exiſtences as have life: and an arrangement of the diſeaſed appearances of the human body conſtitutes the *noſology of man*. Upon the ſame plan of proceeding there might be made out a noſology of every vegetable and every inſect, of every thing, in ſhort, which is animated, from the lord of the creation down to the moſs which he treads upon. The world would thus be filled with noſologies.

We ſuſpect there is a radical difficulty in all theſe noſological attempts, which it is impoſſible to remedy; and this is, that nature has not diſtinguiſhed ſymptom from ſymptom, in diſeaſes, with the ſame exactneſs by which plant differs from plant, or one animal or mineral varies from another; but, on the contrary, has interwoven the tiſſue of diſeaſes by threads which are inextricable, but by a more correct and ſcientific acquaintance *with their cauſes*. At preſent, not only the *claſſes*, *orders*, and *genera* in noſology, are, as in other caſes of ſyſtematizing, *contrivances of the human head*; but, in moſt of the examples they afford, the *ſpecies* and *varieties* are alſo: ſo that, really, noſology is little elſe than an arrangement of *words* and not of *things*. Perhaps, in the whole circle of human exertion there has not often been an expenditure of ſo much labour and talent to ſo little purpoſe. If there is any branch of knowledge to which *noſology* bears a near reſemblance, it is *heraldry*, where verbiage and nonſenſe have taken almoſt entire poſſeſſion of the field.

If any thing could reſcue noſology from the charge of frivoloufneſs, it is the ſpecimen lately exhibited by Dr. Darwin in Zoonomia. Relinquiſhing the viſionary and ſuperficial arrangements of his predeceſſors, this phyſician adopts four natural claſſes of diſeaſes, founded upon their proximate cauſes, and conſiſting of the different modes of morbid action of the four faculties of the ſenſorium, denominated thoſe of irritation, ſenſation, volition, and aſſociation. As the eſſential characteriſtic of a diſeaſe conſiſts in its proximate cauſe, the noſologiſt can find no other ground upon which he may ſo firmly reſt his claſſic character. Dr. Cullen ſeems to have been ſenſible of the importance of the proximate cauſe in the claſſification of diſeaſes, when he obſerves (Noſologia Methodica, tom. ii. Prolegom. p. 29), "*Similitudo quidem morborum in ſimilitudine cauſæ eorum proximæ, qualiſcunque ſit, reverâ conſiſtit.*"—Dr. Darwin takes the characters of the

the months of July, Auguſt, and September, in which time of the year there is ſo great havock made among theſe people? They generally are addicted to drinking great quantities of ſpirituous liquor whenever they can get it, and often lie in the open air during the night. This is a common practice with ſome, and ſeems to be a very injurious one, for the air is ſo very moiſt, that ſails, during the night, become as wet as if dipped in water. The poorer people live crowded together, and ſleep on damp earthen floors, with merely a mat under them: by theſe means they muſt be expoſed ſtill more to the effects of the principle of infection. The months of July, Auguſt, and September, are very wet; ſo much ſo, that they are called the rainy months, producing all the moiſture as well as heat neceſſary to haſten putrefaction. In ſhort, there is every thing here that is any way conducive to the production of fever.

The ſymptoms that generally attend this diſeaſe are the following, as related by the phyſician of the King's Hoſpital: The perſon is firſt attacked with pain in the head, back, loins, abdomen, and thighs, accompanied with fever, which ſometimes takes place at the firſt, and is very violent. The pain in the abdomen reſembles that of colic. Theſe continue three or four days. If no relief is afforded at the end of this time, vomiting comes on, unleſs a ſort of diarrhœa ſhall have taken place during the firſt two or three days, which being the caſe, the vomiting is prevented. But if a diarrhœa cannot be procured, the vomiting comes on, and is a very unfavourable ſymptom. The matter ejected is of a darkiſh colour, often reſembling coffee grounds, and tinctured with blood, which is a bad ſymptom. If the bowels have been coſtive, they now become looſe, and the excrement that paſſes off by ſtool is very fœtid and bloody. If the patient ſhould ſurvive ſome days, and the vomiting turn to be pure blood, and pure blood be alſo diſcharged by the anus, ears, eyes, any or all of theſe ways, it is a good ſymptom: or if a vomiting of blood takes place in the firſt ſtage, a favourable concluſion of the caſe is to be drawn. The moſt deſperate caſes are thoſe attended with bubos, which are not uncommon. The phyſicians do little in theſe caſes: they truſt principally to nature to ſtop the vomiting, as they know of no medicine that can produce this effect.

Their practice, as far as it extends, is ſimple and good. When thoſe pains take place in the inteſtines, they give gliſ-

ters, every quarter or half an hour, of caſtor oil and water, as is commonly done, and order the patient to drink lemonade freely.

With reſpect to bleeding, this phyſician ſpoke but little in favour of it, and it is very ſeldom reſorted to; "but," ſaid he, "it depends on the habit of body of the patient: if he is of a robuſt conſtitution, bleeding may be uſed with ſervice; but we are afraid of drawing blood, becauſe the part from which it is drawn will have a greater quantity of blood carried to it, and the tendency to putrefaction of that part will be increaſed."

He mentioned ſeveral diſſections, in which the ſtomach and inteſtines were found in a putrid ſtate: the contents of the cranium had undergone no particular change.

After the viſit to the King's Hoſpital, Mr. Thorne made another to the City Hoſpital. The phyſician of this hoſpital was not in attendance at the time; but from what is reported of his practice, he has been very ſucceſsful. His practice (which he has adopted lately) is to bleed; and previous to this, and after it, he gives ice, lemonade, and applies ice externally to the abdomen, and uſes gliſters freely. This practice he has found to be ſucceſsful.

Cold bath and bliſters are aſſerted by this phyſician to be injurious. But if ſo, how (aſks Mr. Thorne) is the ice of ſervice? Reſpecting their opinion of the nature of the cauſe of this diſeaſe, little can be collected; but it is to be concluded they know very little about it. The medical gentlemen here meet, in a little time, to confer on this point.

Of all the Americans who have been here, only three have been attacked with this complaint, and ſome of them have been here four months. Two of them lodged next door to a hoſpital, to which they attributed their diſeaſe: the third was on ſhore during the day, but ſlept on board of his veſſel. They all recovered.

Mr. Thorne ſtates that ſeveral of their men had been attacked with ſomething like this diſeaſe, but had recovered.

orders from the exceſs, deficiency, retrograde action, or other properties of the proximate cauſe. The genus is generally derived from the proximate effect; and the ſpecies generally from the locality of the diſeaſe in the ſyſtem. The advantages of this method of claſſing diſeaſes, according to their proximate cauſes, over all preceding ſyſtems of noſology, ſeem to conſiſt in leading to a more diſtinct and thorough knowledge of the nature of diſeaſes, by a compariſon of their eſſential properties—in facilitating the knowledge of the methods of cure, by bringing together thoſe diſeaſes in a natural method of claſſification, which require ſimilar treatment—and in unfolding to phyſicians the nature and treatment of diſeaſes previouſly unknown, which will always be more readily effected by a natural than an artificial ſyſtem of claſſification.

The formulæ in this collection are various and numerous; and we cannot but remark on the prevailing neatneſs and elegance of preſcriptions among modern phyſicians. We hope ſimplicity will prevail much more in their *recipes*. The compound powder of ipecacuanha, commonly called *Dovar*'s powder, is an inſtance of this. Dr. T. directs it to be made thus: "Take of powdered ipecacuanha, and of purified opium, each one dram, of the ſulphate of potaſh one ounce, mix and rub them well together, until they ſhall have acquired the appearance of a homogeneous powder."—Dr. THOMAS DOVAR, who has left a little practical book, called "*The Ancient Phyſician's Legacy to his Country*," gave the receipt for this ſudorific "preſcription to eaſe the gout" thus: "Take opium one ounce, ſalt-petre and tartar vitriolated each four ounces, ipecacuanha one ounce, liquoriſh one ounce: put the ſalt-petre and tartar into a red-hot mortar, ſtirring them with a ſpoon until they have done flaming: then powder them very fine; after that ſlice in your opium; grind theſe to powder, and then mix the other powders with theſe. Doſe from forty to ſixty or ſeventy grains, in a glaſs of white-wine-poſſet, going to bed: covering up warm, and drinking a quart or three pints of the poſſet drink while ſweating."

A compariſon of the *new* with the *old* mode of preparing this excellent remedy will illuſtrate the greater exactneſs, neatneſs, and eaſe, of making the preſcription now in uſe.

This manual, which Dr. T. has offered to the public, may, we think, be of advantage to ſuch perſons as are not poſſeſſed of the originals: and we hope there will ariſe no objection to the performance becauſe it is written in Latin; for we

cannot but recommend the ſtudy of this learned language, not only as ornamental, but as highly uſeful and neceſſary to conſtitute a great and accompliſhed phyſician.

ART. III. *A Semi-annual Oration, on the Origin of Peſtilential Diſeaſes, delivered before the Academy of Medicine of Philadelphia, on the 17th Day of December, 1798. By* Charles Caldwell, *A. M. M. D. Senior Vice-Preſident of the Academy. Philadelphia.* Bradfords. 1799. *pp.* 59.

IT is one of the laudable rules of the Academy of Medicine, enjoined by their conſtitution, that an oration be ſemi-annually pronounced by one of their members. The advantages of this rule, in recalling the minds of the academicians to the principles on which the aſſociation was inſtituted, in exciting each other from the languors into which incorporated bodies are too apt to ſink, and in impelling each member in rotation to ſhare the duties and aſſiſt the progreſs of the inſtitution, muſt be extremely obvious.

After ſome prefatory obſervations, containing apologies for the imperfections of the performance, and deprecations of the rigour of criticiſm, which we conceive to be unneceſſarily protracted, Dr. Caldwell proceeds to expoſe the blindneſs and folly which ſo generally lead mankind to imagine peſtilential diſeaſes imported from abroad. Theſe diſeaſes have been chaſed through every quarter of the globe with an ardour which nothing could eſcape; but the hiding-place from which they originally ſprang has never yet been found; and they often dart upon their purſuers with a ſuddenneſs and fatality which beſpeak them to be occaſionally the natives of every climate. In this, as in many other inſtances, ſelf-love, carried to exceſs, acts an irrational part. When peſtilential diſeaſes appear, it is ſurely more eligible, if equally ſupported by truth, to conſider them as originating from cauſes near at hand, and, conſequently, ſubject to controul and removal, than as imported from abroad, and liable to be introduced by a thouſand accidents, independent of ourſelves.

Among the arguments which induce Dr. C. to conſider the peſtilential diſeaſes of the United States as the offſpring of our

own country, is the coincidence of a peculiar conſtitution of atmoſphere. The experience of ages, he contends, will prove that peſtilence can never become epidemic without the concurrence of ſuch a conſtitution. Without deciding whether theſe inſalutary conſtitutions depend upon noxious matter exhaled from the bowels of the earth by earthquakes or volcanos, or any other operation of ſubterraneous fires, he contents himſelf with aſſerting the cotemporary relation of theſe occurrences. And he ſuppoſes the doctrine of morbid conſtitutions of atmoſphere to be eſtabliſhed beyond diſpute, by the prevalence of peſtilential diſeaſes in different and diſtant parts of the globe at the ſame time.

That ſuch a general conſtitution has prevailed in the United States, our author ſuppoſes to be rendered probable by the great number of inſects which have appeared for ſome years paſt. He mentions particularly the Heſſian fly, graſs-hoppers, and muſketoes. The firſt, however, it muſt be remarked, appeared, and committed great ravages, for many years before the occurrence of our late peſtilential epidemics. The fact of the aſtoniſhing number of locuſts which appeared during the memorable plague of Juſtinian, is adduced by way of corroboration of this opinion. Dr. C. alſo infers ſomething uncommon in the ſtate of the air in the late unhealthy ſeaſons—from the frequency of luminous meteors—from the rapid maturity and decay of the fruits of thoſe ſeaſons, as well as from the appearance of ſecond crops of bloſſoms; and, in ſome inſtances, even of ſecond crops of fruit. To theſe proofs of the occaſional exiſtence of ſuch a morbid conſtitution is added the wide-ſpreading prevalence of that ſort of catarrh commonly called influenza.

After theſe obſervations upon general conſtitutions of the air, Dr. C. goes on to treat of ſuch as are local and particular. The moſt frequent ſource of theſe local infections he ſuppoſes to be the putrefaction of organized bodies. In conſidering putrefaction as a generic term, embracing ſeveral ſpecies, and in making ſmall-pox, meaſles, and ſyphilis, the reſults of peculiar modifications of putrefaction, we are apprehenſive that Dr. C. violates probability. We are more inclined to the opinion, that thoſe diſeaſes, poſſeſſing a ſpecific contagion, and a character permanently fixed, are the reſults of a vitiated animal ſecretion, and depend, for their propagation, upon the exiſting ſtock of virus diſſeminated over the globe, or upon a recurrence to the ſource, whatever that may

have been, from which they were originally derived. The phenomena of cow-pox, as lately laid before the public, ſeem to go far towards the illuſtration of this ſubject.

In the next place Dr. C. applies his general doctrine to the particular ſituation and circumſtances of the city in which he reſides. He thinks Philadelphia unfortunately ſituated for ventilation, on account of its diſtance from the ocean, and the want of elevation. The exceſſive heat of the ſummer, increaſed by various circumſtances conſiderably beyond that of the adjacent country, holds a large ſhare in producing the miſchief. But he dwells with more force upon an evil which admits of a remedy, viz. the immenſe collections of filth in and about that city—an evil continually increaſing with the progreſſive enlargement of the city, and threatening conſequences ſtill more dreadful than ſuch as have been already ſuffered. He enforces the neceſſity of reform in the conſtruction of docks and wharves—in the cleanſing of the commons lying in a ſouth-weſtern direction from the town—and in the removal of burying-grounds to a diſtance from the city.

In an introduction prefixed to this oration, Dr. C. more explicitly undertakes to declare his opinions concerning the ſhare which commerce holds among the cauſes of our peſtilential epidemics. He does not believe that, in the years 1793, 1797, or 1798, the American peſtilence was excluſively of domeſtic origin; but proteſting againſt the opinion of its origin from human contagion, he aſcribes much miſchief to the foul air emitted from the putrid ballaſt and damaged cargoes of veſſels. We are not diſpoſed to controvert; on the contrary, we admit the frequent production of caſes of peſtilence from this ſource. That ſuch a cauſe, however, can produce an epidemic prevalence of the diſeaſe, we ſcarcely can believe.—This ſubject has been involved in much intricacy, both in popular and medical diſcuſſion, by an improper confounding of facts as well as of terms. It were to be wiſhed, that the advocates of the importation of peſtilence would always explicitly ſay whether they derive the diſeaſe in queſtion from human contagion, propagated from one perſon to another, or from ſubſtances imbued with ſuch contagion, by contact or a certain nearneſs of approach, like the ſmall-pox and the meazles; or whether they only derive it from the miaſmata of putrefaction, accumulated and pent up in the holds of veſſels or other cloſe places. If they mean the former, the facts on which they ſubſtantiate the [illegible] never yet been laid

before the public; and, if the latter, all controverſy ſhould ceaſe. The noxious air of a ſhip's hold differs not materially from that of a houſe or a ſewer. The clamour of importation becomes abſurd: for we ſurely have all the requiſite materials in as great abundance at home (viz. the heat, the moiſture, and the dead animal and vegetable matter) as they can poſſibly be furniſhed in the Weſt-Indies.

Of the confidence with which the author looks forward to the prevalence of the doctrine of the domeſtic origin of peſtilential diſeaſes, as well as of his ſtyle and manner, we offer the following ſpecimen:

"Before concluding my addreſs, allow me, Gentlemen, to congratulate you on the ſucceſs, I had almoſt ſaid the *triumph*, of the principles which the Academy advocates, reſpecting the origin of the late epidemics of America. To ſay that theſe diſeaſes are of domeſtic growth, is no longer denounced as medical hereſy, nor as a ſpecies of blaſphemy againſt our country. On this ſubject the ſhades of prejudice and error are rapidly retreating before the radiance of liberality and truth. As far as relates to the neceſſary importation of peſtilential diſeaſes from foreign countries, the time-worn fabric of ſuperſtition in medicine has received a revolutionary blow, from which it is tottering to the depth of its foundation! Nor is the time far diſtant, when this humiliating monument of the bigotry of ages ſhall tumble to irreparable ruins, around the hoary heads of its ſupporters."

"Perſevere, then, my fellow members, to the completion of the work you have ſo laudably undertaken. Wage for yourſelves, both jointly and individually, nothing leſs than a war of utter extermination againſt thoſe prejudices and errors which threaten the depopulation of the cities of America. While thus engaged, whatever may be the fate of your reputations, with a few of your narrow minded cotemporaries, be aſſured, that, if you continue firm in the track where *philanthropy* leads, and *ſcience* lights the way, you will not, you cannot, fail to receive the approbation and applauſe of a more enlightened and grateful poſterity!"

Such as look for new facts to eſtabliſh the opinions here undertaken to be maintained, or new reaſonings upon the old ſtock, will be diſappointed in the peruſal of this oration.—Amidſt much circuitous and variegated amplification of the more familiar doctrines, and a remarkable diffuſeneſs of ſtyle, which further experience in writing will doubtleſs correct,

we see little that has escaped the notice of former writers on this subject. But, at the same time, we must allow, that great good may be done in combating the misstatements, the prejudices, and narrow views of the importers of pestilence, by laying before the public, again and again, under every variety of form and manner, that mass of facts, reasoning and demonstration, which cannot ultimately fail of producing conviction in every candid mind.

MEDICAL & PHILOSOPHICAL NEWS.

DOMESTIC.

State of the Weather and Diseases.

THE approach of the ſeaſon of epidemic ſickneſs awakens all the apprehenſions in the American cities which were ſo deeply impreſſed by the calamities of laſt year. Many reaſons afford ground to believe, that the inſalutary conſtitution of the atmoſphere, whoſe effects have been often felt in the courſe of ſome years paſt, has not yet expended all its force. In many parts of the country, inflammatory diſeaſes, during the winter and ſpring, were more frequent and obſtinate than uſual. In ſome inſtances they diſplayed a malignancy of character not commonly obſerved. The ſmall-pox was ſpread, in the uſual manner, through this city and Philadelphia, by means of inoculation; and, if we are not greatly miſinformed, ſhewed, in numerous inſtances, more unfavourable appearances than common.

The late winter was very long and ſevere. The coldeſt weather of the ſeaſon was during the firſt week in March. Froſt and ſnow began ſo ſoon in autumn, and continued ſo late in the ſpring, that many cattle ſtarved to death throughout the country for want of provender. The ſcarcity of fodder may be judged of by this circumſtance—that there was no grazing, in this part of the United States, between the end of October and the beginning of May. Yet, notwithſtanding the duration and intenſeneſs of the winter, there were inſtances of diſeaſe now and then to be met in the city of New-York, cauſed by ſeptic effluvia. A number of theſe could be traced directly to the remains of the tainted or ſpoiled beef of the preceding ſeaſon, ſold at auction, during the cold weather, for half a dollar the barrel, or for what it would fetch, and uſed for food, in its ſemi-putrid ſtate, by ſome of the poorer order of houſe-keepers: and thus the poiſon was kept in action, and ſpread about the city, in parts very remote from foreign ports, wharves, ſhips, or their cargoes. In ſome caſes, the febrile ſymptoms ariſing from ſuch diet and exhalations became ſerious and alarming.

Since the beginning of ſummer nothing very remarkable has occurred. The weather, though frequently hot, has not generally exceeded the ordinary temperature of the ſeaſon. Rains have fallen ſo ſeaſonably, both as to time and quantity, as to exempt this part of the country from all the inconveniencies of drought and inundation. Remittent fevers have been obſerved in many inſtances, and occaſionally they have been attended with peſtilential ſymptoms. The number of theſe, however, has been ſmall; they have ſhown no tendency to become epidemic; and are probably to be aſcribed either to extraordinary circumſtances of expoſure to putrid effluvia, or to an unuſual prediſpoſition of ſyſtem. The ſporadic inſtances of peſtilential diſeaſe in this ſeaſon, though ſo few in number, are very inſtructive on the conteſted point of their origin. In this city they are not even pretended to be traced to any foreign contagion; and the ſick, ſurrounded as uſual by attendants, have in no inſtance communicated their diſeaſe. And yet, in the more advanced ſtages of our ſeaſons, when noxious exhalations are wrought up to a higher point of virulence, are more diſperſed, and the diſeaſe, of courſe, becomes epidemic, notwithſtanding its confinement, in reſpect of infection, to the local bounds of filth, putrefaction, and confined air, a ſudden transformation (according to the opinion of ſome perſons) takes place, the diſorder, in a moment, is borne on the wings of contagion, and in this manner alone is enabled to fly through its circumſcribed domain!

Lying-in Hospital.

A ſubſcription having been opened in the city of New-York, for the purpoſe of eſtabliſhing an aſylum for the reception of women in a ſtate of pregnancy, who are unable to procure the neceſſary medical aſſiſtance and nurſing, during the period of their confinement in child-bed; and many perſons, influenced by principles of benevolence and charity towards the above claſs of the unfortunate, having liberally ſubſcribed towards the ſame, a meeting of the ſubſcribers was held at the Tontine Coffee-Houſe, on the 9th day of December, in the year 1798, for the purpoſe of carrying it into effect. To this end, Thomas Pearſall, ſen. Robert Lenox, Dr. T. S. Robertſon, Henry Remſen, and Dr. David Hoſack, were appointed a Committee to draft a Conſtitution for the regulation of the above-mentioned eſtabliſhment.

A Conſtitution having been drawn up by the Committee,

and offered to the conſideration of the ſubſcribers, the ſame was approved, and directed to be executed as ſoon as a ſum of money ſhall be ſubſcribed which the Governors may deem ſufficient to defray the expence of the inſtitution.

At a ſubſequent meeting of the ſubſcribers, the following gentlemen were elected Governors for one year:

Thomas Pearſall,	William Houſton,
Rev. Dr. Kunze,	John Charlton,
Robert Lenox,	Andrew Hamerſley,
Cornelius Ray,	David M. Clarkſon,
Archibald Gracie,	William Jauncey,
J. S. Robertſon,	J. C. Van Den Heuvel.
Henry Remſen,	

The Governors, according to the conſtitution, have elected the following perſons as phyſicians of this charity for one year:

Dr. J. R. B. Rodgers,	Dr. Poſt,
Dr. David Hoſack,	Dr. Moore.

We are informed that this Hoſpital will be ready for the reception of patients on the firſt of Auguſt.

A number of perſons have been incorporated in New-York, under the title of the *Manhattan Company*, with the power to raiſe a large capital, for the purpoſe of ſupplying the city with pure and wholeſome water. For the completion of this they are allowed ten years, with the right to employ their ſurplus capital in any manner not inconſiſtent with the conſtitution and laws of the State and of the nation. The Company have made ſome preparations toward the completion of this great and deſirable object.

It is pleaſing to find the people of Philadelphia engaged with ſo much aſſiduity in the plan of ſupplying their city with water. Meaſures are begun, and already in forwardneſs, by which the waters of Schuylkill, which are found, upon experiment, to be eminently pure and wholeſome, will be conveyed to the town in any deſirable quantity. This water will be raiſed to a conſiderable height by the force of ſteam, and conducted through a ſubterranean channel to a reſervoir, built in the central ſquare of the city. Hence it will be plentifully diſtributed through the ſeveral ſtreets; and, by means of ſecondary and ſmaller pipes, conveyed at pleaſure to every houſe.

At a commencement held on the 6th day of June, 1799, at the Univerſity of Pennſylvania, the degree of Doctor of Medicine was conferred on the following gentlemen, who ſubmitted Inaugural Diſſertations to the examination of the Medical Faculty on the following ſubjects:

Mr. Edward Brailsford, of Charleſton, South-Carolina—An Experimental Diſſertation on the Chemical and Medical Qualities of the Nicotiana Tabacum of Linnæus, commonly known by the Name of Tobacco.

Mr. John H. Fouſhee, of Virginia—An Eſſay on Strictures in the Urethra.

Mr. William G. Chalwill, of Tortola—A Diſſertation on the Source of Malignant Bilious, or Yellow Fever, and the Means of preventing it.

Mr. James Norcom, of North-Carolina—On Jaundice; containing Obſervations on the Liver, and ſome of its Diſeaſes.

Mr. Waſhington Watts, of Virginia—An Inquiry into the Cauſes and Nature of the Yellow Fever.

Mr. Arthur May, of Pennſylvania—A Diſſertation on Sympathy.

Mr. Robert J. King, of Maryland—An Eſſay on Bliſters.

A periodical work, entitled the *Monthly Magazine*, has been lately undertaken in New-York. Three numbers have appeared, and they afford a handſome and inviting proof of the judgment and talents of the editor. Beſides a variety of original matter, both entertaining and inſtructive, the *review of American publications*, which the New-York Monthly Magazine contains, is extenſive, and executed with ability and candour. The view which it affords of American literature is truly intereſting.

History.

We are aſſured that a new publication on the *hiſtory of North-Carolina* is in great forwardneſs, and will be put to preſs in the courſe of the enſuing winter. The author is Hugh Williamſon, M. D. and LL. D. long a reſident of that State, and for many years employed in its public concerns.—We have reaſon to believe this performance will be a valuable addition to the ſtock of American literature.

During the ſeſſion of the Legiſlature of New-York at Al-

many, in the winter of 1798, an act was paſſed to encourage the writing a hiſtory of that State. This arduous work has been undertaken by the Rev. Samuel Miller, A. M. one of the Miniſters of the Preſbyterian Church in the city of New-York, who has already collected a large amount of materials. The bill, which was brought in by Dr. Mitchill, provides for opening the Secretary's and Clerk's offices, throughout the State, to the hiſtorian, and for enabling him to inſpect and tranſcribe the public papers and records which he may want, without payment of the ordinary fees. In a few years, we feel perſuaded, both the civil and natural hiſtory of New-York, which have hitherto been greatly neglected and confuſed, will be brought up to a modern period, with as much perſpicuity and exactneſs as the nature of the ſubjects will admit.

Zoology.

An animal of the *Bos* family, ſaid to be the Pygarg of Deuteronomy xiv. 5. has been exhibited lately in New-York. The creature is a female, and anſwers very well to the Biſon of 2 Pennant's Arctic Zoology. The proprietor ſaid ſhe was brought from Ruſſia, though we think it more probable ſhe is a native of ſome northern part of the American continent.

For ſome time paſt, that large and ſingular bird the *Caſſowary*, has been ſhewn in this city: it was brought, as they ſay, from Batavia. The common deſcriptions of writers are correct enough, as there is little chance of confounding this remarkable animal with any other of the feathered race.

Medical School of New-York.

The annual Medical Lectures in the College of New-York will commence, as uſual, on the firſt Monday of November next; when the courſe on Chemiſtry will be begun by Profeſſor Mitchill; on Anatomy and Surgery by Profeſſor Poſt; on the Theory and Practice of Phyſic by Profeſſor Hamerſley; on Materia Medica by Profeſſor Hoſack; and on Midwifery and Clinical Medicine, in the New-York Hoſpital, by Profeſſor Rodgers.

The lovers of the fine arts have, at this time, an opportunity of being highly gratified in viewing the collection of portraits belonging to Mr. Sharples, in this city. It conſiſts of ſeveral hundred likeneſſes of diſtinguiſhed characters, moſtly now

alive, done by that ingenious artiſt himſelf, and is rapidly increaſing. The pieces are chiefly executed in the crayon ſtile, in a particular manner, wherein Mr. Sharples is very happy and ſucceſsful.

Botany.

The following living plants have been lately received by Dr. Hoſack, Profeſſor of Botany in Columbia College, from Dr. Anderſon, ſuperintendant of the Botanic Garden at St. Vincents.

1. Bread-fruit (Artocarpus Inciſus).
2. Arrow Root (Maranta Arundinacea).
3. Cinnamon (Laurus Cinnamomum).
4. Mango (Mangifera Indica).
5. Vanilla (Epidendrum Vanilla).
6. Lemon Graſs (Andropogon Schoenanthus).
7. Sago (Cycas Circinalis).
8. Dracæna Ferrea.
9. Turmerick (Curcuma Longa).
10. Galengal (Kæmpferia Galanga).
11. Gum Arabic (Mimoſa Nilotica).
12. Liquorice (Glycyrrhiza Glabra).

This preſent was accompanied with about 300 kinds of ſeed of the moſt valuable plants.

The Profeſſor of Botany has alſo lately received from Dr. Smith, Preſident of the Linnæan Society, a large collection of ſome of the moſt valuable of the recent publications on botany.

It is greatly to be deſired that the Legiſlature of the State of New-York ſhould appropriate a ſum of money to the eſtabliſhment of a Botanic Garden in this city. The advantages of ſuch an eſtabliſhment, in improving the means of medical education in Columbia College, and in promoting the riſing ſcientific taſte of our country, are too obvious to need to be mentioned.

The Chemical Society of Philadelphia, beſides a variety of other minerals, from different parts of the United States, have lately received a ſpecimen of the golden or auriferous pyrites from Virginia, from ten pennyweights of which, three grains of gold, twenty-four carats fine, have been extracted.

A quantity of manganeſe has been ſent to the ſociety, from the county of Albermarle, where it is found in abundance.

This mineral now retails in Philadelphia at the rate of elevenpence per pound. It is conſumed in this country principally by potters. It is uſed in Europe, in bleaching, and in the manufacture of glaſs.

A variety of the ſulphate of barytes, called Lapis Hepaticus, accurately deſcribed by Cronſtedt, as the Lieberſtein, or Liverſtone, of the Germans and Swedes, has alſo been forwarded to the ſociety from the ſame place.

This mineral almoſt always accompanies the beſt metallic ores, and is conſidered by mineralogiſts as a happy preſage of finding them. According to the celebrated Becher, it is a certain indication *aut præſentis aut futuri metalli.*

It is hoped that the importance of mineral ſubſtances in agriculture and manufactures, will induce the farmers, and other gentlemen of the United States, to attend to the mineral products of their fields, and ſend them to the Chemical Society of Philadelphia, where they will be accurately analyzed, free of expence. By this means many valuable diſcoveries may be made, and we may become acquainted with the operations of nature in this part of the globe.

Profeſſor Ruſh has juſt publiſhed "Three Lectures upon Animal Life, delivered in the Univerſity of Pennſylvania."

Profeſſor Barton has alſo lately publiſhed, "Fragments of the Natural Hiſtory of Pennſylvania. Part firſt."

Both theſe important publications will be duly noticed in our next number.

Profeſſor Woodhouſe has returned an experimental anſwer to Dr. Prieſtley's pamphlet on phlogiſton, heretofore mentioned in the Medical Repoſitory. It will be given to the public in the fourth volume of the Tranſactions of the American Philoſophical Society, now in the preſs at Philadelphia.

The Academy of Medicine in the city of Philadelphia, whoſe able reports on matters of health have been frequently publiſhed for general inſtruction, has lately obtained a charter of incorporation. The members are aſſiduouſly purſuing the objects of the inſtitution, which are generally the improvement of knowledge concerning the epidemics of North-America; and much good may be expected from their labours. At a late meeting of this learned body, Profeſſor Mitchill, and Edward Miller, M. D. of the city of New-York, were elected correſponding members.

FOREIGN.

Cow-Pox.

We have already given an account of Drs. Jenner and Pearſon's publications on the cow-pox, which tended to eſtabliſh the important fact, that thoſe who have had that diſeaſe, which never proves fatal, and which may always be ſo managed as never to diſfigure the patient, are not capable of afterwards taking the ſmall-pox infection—a fact which, if properly followed up, promiſes fair to extirpate the latter diſeaſe, to which more have fallen victims than to the peſtilence itſelf. Drs. Pearſon, Jenner, and Woodville, with a zeal that does them great honour, have ſince beſtowed much attention and labour in aſcertaining, by proper trials, how far it is prudent to perſevere in ſubſtituting a diſeaſe that has hitherto appeared no way dangerous, for one that ſo often proves mortal; and, we are happy to add, with a ſucceſs equal to the moſt ſanguine expectations that could have been formed: in conſequence of which, the following circular letter has been addreſſed to the gentlemen of the faculty:

Sir, *Leiceſter Square, March* 12, 1799.

I hope you will pardon me for taking the liberty to inform you, by way of additional evidence to the teſtimonies I have publiſhed on the ſubject of the cow-pox, that upwards of one hundred and ſixty patients, from two weeks to forty years of age, principally infants, have been inoculated, ſince the twentieth of January laſt, by Dr. Woodville and myſelf ſeparately. I ſhall, at preſent, only communicate the following obſervations:

1. Not one mortal caſe occurred. 2. Not one of the patients was conſidered to be dangerouſly ill. 3. Although the extreme caſes of the ſevere kind, which ordinarily occur in the ſame number of caſes in the inoculated ſmall-pox, did not occur in the above practice; and although many of the patients were even more ſlightly diſordered conſtitutionally, yet the whole amount of the conſtitutional illneſs ſeemed to be as great as in the ſame number of patients in the inoculated ſmall-pox. 4. None of the patients (namely, above ſixty) hitherto inoculated for the ſmall-pox, ſubſequently to the vaccine diſeaſe, took the infection. 5. One of the moſt important facts is, that the local affection in the inoculated part, on the whole, was leſs conſiderable, and of ſhorter duration

than in the inoculated ſmall-pox. 6. In many of the caſes eruptions on the body appeared, ſome of which could not be diſtinguiſhed from the ſmall-pox.

I have ſent the matter of the cow-pox puſtule on the thread incloſed, in order, if you approve of the inquiry, to inoculate with it; and I intreat you to favour me with the reſult of your trials: but I muſt trouble you to apply the teſt of inoculating with variolous matter ſubſequently to the vaccine diſorder.

I have the honour to be, &c. &c. &c.

G. PEARSON,

P. S. I am happy to be able to ſtate, that at Berkeley Dr. Jenner has continued his trials of inoculation with vaccine matter, ſent from London, with good ſucceſs. I ſhould have given you a more circumſtantial account of the caſes here alluded to, but I think it unneceſſary, as Dr. Woodville has a pamphlet in the preſs on the ſubject. [*Philoſ. Mag.*

Recent and numerous experiments, made by the moſt eminent of the faculty in London, tend to confirm the efficacy of the cow-pox, as a means of extirpating that horrible ſcourge of the human race, the ſmall-pox. Several hundred individuals have recently been inoculated for this new diſeaſe in the metropolis, and they have all taken it, and recovered from it in a few days, without its being attended by any illneſs, other than a few puſtules which have appeared in the arm. Theſe perſons have ſince been repeatedly inoculated with the variolous matter of the ſmall-pox, but without effect. Several of them have even ſlept in the ſame bed with perſons in the moſt infectious ſtate of the latter diſorder, but without being in any degree affected by it. *Monthly Mag.*

A tranſlation is in forwardneſs of the valuable Travels of the *Duke de Rochefoucault Liancourt* in North-America, ſo late as the years 1796, 1797, and 1798. The known talents of the enlightened and noble traveller, and the imperfect knowledge, in Europe, of the preſent condition of the United States and of Canada, will, doubtleſs, occaſion theſe volumes to be an acceptable addition to the exiſting books of travels in the Engliſh language.

AGRICULTURE.

It has been commonly ſuppoſed by farmers, that ſeeds and plants will degenerate, unleſs the ground on which they are

planted be frequently changed. Some obſervations and experiments that have been lately made in this country, as well as in America, ſeem to render the truth of this ſuppoſition doubtful. It has been found here, that even potatoes may be conſtantly grown on the ſame piece of ground without any degeneration, provided the cuttings be always made from the fineſt potatoes, inſtead of the ſmalleſt and worſt, which have actually been employed for this purpoſe: and in America, it has been ſhewn, by the actual experiments of Mr. Cooper, that the ſame thing happens with reſpect to the ſeeds of the long watery ſquaſh, early peas, potatoes, and ſeveral other kinds of vegetables. The ſame principle has, indeed, long ago, been applied in the breeding of animals, by Mr. Bakewell. It is generally known, that he improved his breeds by merely coupling thoſe in which the properties he wiſhed to produce were the moſt evident, not regarding conſanguinity, or any other circumſtance.

This is a matter of ſuch extenſive application and importance, that it ought more particularly to engage the attention and obſervation of the practical farmer as well as the horticulturiſt.

In the application of manures to lands too little regard ſeems to have been paid, both in reſpect to its nature and the time of its being laid on. In regard to the laſt, it has been a common practice for farmers to apply manures to graſs lands during the time of froſt in the winter. This is certainly an improper practice, as during ſuch periods no advantage can be derived to the land from it, and, at the thaw, much of its virtues muſt be waſhed away, and its ſoluble parts be deſtroyed; the ground being, in this ſtate, incapable of abſorbing liquids. Many other reaſons forbid this practice, which may be ſeen in an ingenious paper written by Dr. Fenwick. He conceives, that as the elaſtic fluids are the greateſt ſupports of vegetation, manures ought to be applied under circumſtances that favour their generation. Theſe, he ſays, chiefly occur in ſpring, after the graſs has, in ſome degree, covered the ground, by which the dung is ſhaded from the ſun, or early in the autumn, after the hay-crop is removed. This laſt is unqueſtionably the moſt convenient and leaſt objectionable period for the purpoſe in queſtion.

In a Voyage into the Belgic Countries, publiſhed not long ago by the celebrated Forſter, the author ſpeaks of the ſcar-

city of wood of every kind, and eſpecially of that for fuel, with which Europe is threatened. He imputes the growing evil to the great and almoſt ſudden waſte of this valuble neceſſary of life, and goes ſo far as to ſay, that unleſs immediately and effectually checked, it will ſtop the progreſs of civilization, and fruſtrate the efforts of reaſon and philoſophy, in ameliorating the condition of mankind in Europe. However well or ill founded theſe apprehenſions may be, they appear to have excited the attention of France and the Low Countries to ſo deſerving an object. Complaints have been made of the profuſion of wood conſumed in the public offices of France, for which no better reaſon can be given, than that the aſhes (now rendered doubly valuable on account of the quantity of ſalt-petre manufactured in every part of the republic) are the perquiſites of the office keepers.

The French (as was announced in the laſt Monthly Magazine) have formed a National Inſtitute at Cairo. And we cannot but view with reſpect a ſcientific and literary activity, of which the ardour is not to be repreſſed, even by ſuch hardſhips as thoſe of the Egyptian expedition of the French. The liſt of members of this inſtitute contains, among others, the illuſtrious names of Monge, Beauchamp, Berthollet, Dolomieu and Denon. The following queſtions were propoſed at their firſt meeting: 1. How to improve the ſtructure of ovens for the preparation of bread for the army? 2. To find a ſubſtitute that may be uſed inſtead of barley in making beer. 3. What are the beſt means for clarifying and cooling the waters of the Nile? 4. Are wind or water mills the more ſuitable for uſe in Egypt? 5. What are the fitteſt reſources to ſupply the French army in Egypt with gun-powder? 6. What is the preſent ſtate of legiſlation in Egypt; and how may it be ameliorated? 7. To produce a plan of general regulation.—At the ſecond meeting of this inſtitute, Andreoſſy, one of its members, reported, concerning the article of gun-powder, that Egypt had always received its ſupplies of ſulphur from Venice; that its charcoal was ſupplied from the burning of the ſtalks of the lupine; that, however, ſalt-petre is ſufficiently plentiful in Egypt, where it is found both in native veins and alſo manufactured, as in Europe. The ſalt-petre of Egypt he farther reported to be a nitrate of potaſh, and not like the French ſalt-petre, nitrate of lime: the ſtalks of Turkey corn are uſed in its preparation, and it is purified with white of eggs. The gun-powder is

manufactured by workmen who remain naked while they are at work. It is of an excellent quality, and cheaper than gun-powder is in France. The Egyptian gun-powder was formerly an article of exportation to Leghorn. The Beys poſſeſſed no large magazines of gun-powder.—At the third meeting of the inſtitute of Cairo, Berthollet read a memoir on the formation of *ammoniac*; Sulkowſky read a deſcription of the road from Cairo to Salehieé: ſome converſation took place on the ſubject of mills, in which water-mills were concluded to be the fitteſt for uſe in Egypt. Berthollet read an account of the analyſis of the gun-powder of Cairo, in which he ſhewed it to contain only $\frac{5}{32}$ of ſalt-petre, and to be, as to its other ingredients, a mixture of ſulphur, charcoal, earth, and muriate of ſoda, which requires to be lixiviated anew before it can be fit for uſe. Monge read a memoir on the monuments of antiquity in Cairo, in which he propoſed that a particular vaſe of granite, covered with hieroglyphics, ſhould be ſent to France. [*Monthly Mag.*

General Andreoſſy and Citizen Berthollet (according to a diſpatch from Buonaparte of 22 Pluvioſe, 6th year) were on their return from an excurſion to the Lakes of Natron and the Convents of the Copts. They have made ſeveral extremely intereſting diſcoveries; among others, ſome excellent Natron (native alkali), which the ignorance of the miners prevented them from before obſerving. This branch of the commerce of Egypt will thence become ſtill more important.

The favourite ſeats of German literature are ſtill Leipſig, Gottingen, Jena, Weimar, Hamburgh, Berlin, Vienna, Frankfort. Theſe places, either as eminently commercial, as the ſeats of univerſities, and the reſidences of men of letters, on account of particular eſtabliſhments of printers and booksellers, or for other reaſons, have become to the literature of Germany, what Athens and Elis were to that of ancient Greece. Books are inceſſantly manufactured and ſold in them: and amid much mere *book-making*, there are alſo many labours of genuine erudition, occaſional inventions and diſcoveries evincing true philoſophical penetration, and not a few effuſions of poetical genius of ſuperlative excellence.

Dr. Trotter, of the Britiſh navy, is the author, as our readers recollect, of a volume entitled *Medicina Nautica*,

which was publiſhed ſeveral years ago in London. This book has been tranſlated into German by Werner, of Jena, and furniſhed with a learned preface by Hufeland. The author has lately publiſhed a ſecond volume, in which he has devoted a conſiderable number of pages to the diſplay and diſcuſſion of the *doctrine of ſepton*, as contained in the different eſſays publiſhed in the Medical Repoſitory, and in the pieces on the ſame ſubject, therein, from time to time, mentioned or referred to. This volume, we underſtand, is to undergo a German tranſlation by the ſame hand which made a verſion of the firſt.

Dr. Beddoes announces for publication, in two or three weeks, an eſſay on pulmonary conſumption, for the uſe of families.

Report of the Commiſſioners appointed by the National Inſtitute to repeat the Experiments which have been made on Galvaniſm: read in the Name of the Commiſſion, by Cit. Hale. *From the* Bulletin des Sciences, par la Société Philomathique, Thermidor, An. VI.

The commiſſion was not ſatisfied with repeating a great part of the experiments already made: they claſſed them, and rendered them complete by the addition of others which were wanting.

I. The phenomenon of Galvaniſm, taken in general, is as follows: A communication is eſtabliſhed between two points of a ſeries of nervous or muſcular organs, by means of certain determined ſubſtances. At the moment when this communication is made, there take place, in the ſtate of the organs, changes, the nature of which is ſtill unknown; but which are manifeſted by ſenſations more or leſs lively, or contractions more or leſs violent. Theſe muſcular contractions take place even in ſeparated parts of the body, and with as much force as when produced by the moſt effectual means of irritation. The ſeries of muſcular or nervous organs is called the *animal arc*; the other ſubſtances form the *exciting arc*. The compoſition of both may be varied many different ways.

II. Among the effects reſulting from the different compoſitions of the animal arc, the following are the moſt remarkable: A ligature made on a nerve does not intercept Galvaniſm, unleſs it be made on the part ſurrounded with fleſh. If the nerve be cut, and its two ends be in contact, Galvaniſm takes place; but if they are only brought near to each other, without contact, it is intercepted.

III. Among the effects reſulting from the different compoſitions of the exciting arc, we ſhall remark the following: The moſt favourable compoſition is when it conſiſts of three pieces, each of which is a different metal. One muſt touch the nerve, and the other the muſcle: theſe are called the *ſupports* or *armatures*. The third forms the communication: this is called the *communicator*. But one or two of theſe may be omitted. Animal bodies, or water, may be placed between them; or other ſubſtances, either metallic combinations, or all other metals, &c. may be ſubſtituted in their ſtead. It has not yet been poſſible to determine exactly what are the moſt ineffectual combinations; but they have been already claſſed to a certain point, according to the degree of their efficacy. Gold, ſilver, zinc and tin, are the metals moſt favourable to Galvaniſm, when introduced into the exciting arc.

In general a ſingle metal does not act, except when all other circumſtances are favourable; but in that caſe it has been often ſeen to act. Error, however, may readily here ariſe; for, if one of the ends of the arc be alloyed, in a proportion ever ſo little different, the arc acts as if there were two metals. By rubbing one end with a different metal, ſometimes even with the fingers, or by breathing upon it, efficacy may be communicated to it, under circumſtances where it would not otherwiſe have poſſeſſed any.

Oxydes act leſs efficaciouſly, *cæteris paribus*, than their metals. Dry carbon acts as an actual metal. It is not intercepted by water and moiſt ſubſtances, nor by the fingers if wet; but this is not the caſe if the fingers be dry. The energy of Galvaniſm is not intercepted or diminiſhed by pieces of dead fleſh. The effects of it are ſenſibly checked by the epidermis; and they are incomparably greater in flayed animals, or in parts of the human body from which the epidermis has been removed.

It cannot be ſaid that Galvaniſm is intercepted by all idioelectric bodies; but, on the other hand, it is intercepted by all ſubſtances which are ſtrong conductors of electricity. Such are flame, very dry animal bones, the ſteam of water, glaſs brought to a red heat, &c.

IV. Galvaniſm is influenced alſo by ſeveral circumſtances foreign to the compoſition of the two arcs. Such as, 1. The ſtate of the parts which are ſubjected to the operation: the freſher they are, the ſtronger are the effects. 2. The longer or ſhorter exerciſe of Galvaniſm: ſuſceptibility of Galvaniſm

is, in general, excited by exerciſing it; is exhauſted by continuance, and renewed by repoſe. 3. The ſucceſſion of various experiments. A diſpoſition of metals which at firſt had been ineffectual, has become effectual after a different diſpoſition. Two uncertain experiments are hurtful to each other, and become ſtill more ſo if made in ſucceſſion. 4. The ſtate of the atmoſphere. The atmoſphere electric; the animal on which the operation is performed charged and inſulated, the effect is the ſame. The whole apparatus placed under water, the effect remains the ſame.

V. There are various artificial means to weaken or revive the ſuſceptibility of Galvaniſm. Thus, a frog exhauſted and brought near to a charged electrophorus reſumed its ſuſceptibility. Alcohol, on the other hand, weakens, and even extinguiſhes it, ſo as never to return. Potaſh produces the ſame effect, only ſlowly. According to M. de Humbolt, this ſuſceptibility is, in many caſes, reſtored by oxygenated muriatic acid gas. The commiſſioners did not obſerve this circumſtance; but they propoſe to reſume the ſubject, and to repeat ſeveral other experiments of that learned philoſopher.

They have already repeated thoſe on the action of Galvaniſm on the heart, and have obſerved, as he did, that its action is the ſame as on the voluntary muſcles, and that it accelerates their movement.

A new Proceſs for forming the Unguentum Hydrargyri.

As the proceſs of combining mercury with hog's lard is well known to be tedious, and to require a conſiderable time, the following method of ſhortening it has been announced by Göttling, in his "Taſchen-Buch für Scheidkunſtler," for the year 1798. This proceſs, ſays he, can be ſpeedily performed by the addition of a very ſmall quantity of the flowers of ſulphur. For a mixture of two ounces of hog's lard and ſix drachms of quick-ſilver, it will be neceſſary to employ only ſix grains of the flowers of ſulphur, and the proceſs will be completed in a few minutes. I do not ſee, adds M. Göttling, that ſo ſmall a quantity of the flowers of ſulphur can hurt the effect of the mixture, and am of opinion that this preſcription may be of conſiderable uſe in pharmacy. [*Philoſ. Mag.*

Royal Society of London.

At a meeting of this learned body, on the 28th of February, a meteorological paper by Mr. Hutchinſon was read; and a curious paper on the ſubmerged foreſts on the coaſt of Lincolnſhire, endeavouring to aſcertain the epoch of the phenome-

non, and containing geological obſervations on the different ſtates in which trees are found in the earth, by Mr. Joſeph Serra de Correa.

The meetings of March 7th and 14th were occupied in reading a curious paper on hermaphrodites; which contains alſo an account of ſome ſingular experiments on human generation, ſimilar to thoſe made by Spallanzani on the canine ſpecies.

Inſtitution for diffuſing the Knowledge, and facilitating the general Introduction of uſeful Mechanical Inventions and Improvements; and for teaching, by Courſes of Philoſophical Lectures and Experiments, the Application of Science to the common Purpoſes of Life.

Our readers will be happy to learn that a new inſtitution, under the above title, which promiſes to be of great public utility, has been ſet on foot in this capital (London), and is expected ſhortly to be eſtabliſhed by royal charter. The Right Hon. Sir Joſeph Banks, who has ſo long, and with ſo much honour to himſelf, preſided over the Royal Society, and whoſe ardour in purſuing whatever objects may tend to promote the intereſts of ſcience can only be equalled by his liberality, in devoting to their advancement a large portion of a princely income, has given every aid, by his own perſonal exertions and his extenſive influence, to give effect to the plan of this inſtitution, which was projected by Count Rumford, the ſtrenuous advocate for the application of ſcience to the common purpoſes of life.

We ſhall give ſuch a ſketch of the plan as our limits will allow, extracted from Count Rumford's original propoſals for forming the inſtitution.

The two great objects of the inſtitution are, the ſpeedy and general diffuſion of the knowledge of all new and uſeful improvements, in whatever quarter of the world they may originate; and teaching the application of ſcientific diſcoveries to the improvement of arts and manufactures in this country, and to the increaſe of domeſtic comfort and convenience.

Rooms will be prepared for the reception and public exhibition of all new and mechanical inventions and improvements worthy of notice; eſpecially of all ſuch as tend to increaſe the conveniences and comforts of life, to promote domeſtic economy, to improve taſte, or to promote uſeful induſtry.

Perfect models, of the full ſize, will be exhibited in this public repoſitory, of all ſuch new mechanical inventions and improvements as are applicable to the common purpoſes of life. Under this head is included, cottage fire-places, and kitchen utenſils for cottagers; a complete kitchen for a farm-houſe, with all the neceſſary utenſils; a complete kitchen, with kitchen utenſils, for the family of a gentleman of fortune; a complete laundry for a gentleman's family, or for a public hoſpital; ſeveral of the moſt approved ſtoves for heating rooms and paſſages.

The machinery exhibited will, as far as poſſible, be ſhewn in action, or in actual uſe.

Open chimney fire-places, on the moſt approved principles, will be fitted up as models in the different rooms, and fires will be kept conſtantly burning in them during the cold ſeaſon. Ornamental as well as economical grates, for open chimney fire-places, will alſo be exhibited; ornamental ſtoves, in the form of elegant chimney-pieces, for halls, drawing-rooms, eating-rooms, &c.

Working models of the ſteam-engine, of brewers' boilers, of diſtillers' coppers with improved condenſers, of large boilers for the kitchens of hoſpitals, and of ſhips' coppers; all with improved fire-places.

Models of ventilators, of hot-houſes, of lime kilns, of boilers, ſteam-boilers, &c. for preparing food for cattle that are ſtall-fed, of cottages.

Various ſpinning-wheels and looms, with ſuch other machinery as may be uſeful in giving the poor employment at home.

Models of all ſuch new invented machines and implements as bid fair to be of uſe in huſbandry; of bridges on various conſtructions, and of all ſuch other machines and uſeful inſtruments as the managers ſhall deem worthy of the public notice:—each article exhibited to be accompanied with a deſcription of it, properly illuſtrated by correct drawings, the name of the maker, the place of his abode, and the price.

A lecture-room will be fitted up, and a complete laboratory and philoſophical apparatus, with the neceſſary inſtruments, be provided for making chemical and other philoſophical experiments.

Men of the firſt eminence in ſcience will be engaged as lecturers; and no ſubjects be permitted to be diſcuſſed but ſuch as are ſtrictly ſcientifical, and immediately connected with that

particular branch of ſcience publicly announced as the ſubject of the lecture.

Among the branches of ſcience that will occaſionally be made the ſubjects of theſe public lectures, are the following:

Of heat, and its application to the various purpoſes of life; of the combuſtion of inflammable bodies, and the relative quantities of heat producible by the different ſubſtances uſed as fuel; of the management of fire and the economy of fuel; of the principles of the warmth of clothing; of the effects of heat and of cold, and of hot and of cold winds, on the human body, in ſickneſs and in health; of the effects of breathing vitiated and confined air; of means to render dwelling-houſes comfortable and ſalubrious; of the methods of procuring and preſerving ice in ſummer, and of the beſt principles for conſtructing ice-houſes; of the means of preſerving food in different ſeaſons and climates; of the means of cooling liquors without the aſſiſtance of ice; of vegetation, and of the ſpecific nature of thoſe effects that are produced by manures; and of the art of compoſing manures, and adapting them to the different kinds of ſoil; of the nature of thoſe changes that are produced on ſubſtances uſed as food in the various proceſſes of cookery; of the nature of thoſe changes which take place in the digeſtion of food; of the chemical principles of the proceſs of tanning leather, and of the objects that muſt particularly be had in view, in attempts to improve that moſt uſeful art; of the chemical principles of the art of making ſoap; of the art of bleaching; of the art of dyeing; and, in general, of all the mechanical arts, as they apply to the various branches of manufacture.

In order that the proprietors of the inſtitution, and the ſubſcribers, may have the earlieſt notice of all new diſcoveries and uſeful improvements that ſhall be made from time to time, not only in this country, but alſo in all the different parts of the world, the managers will employ the proper means for obtaining, as early as poſſible, from every part of the Britiſh empire, and from all foreign countries, authentic accounts of all ſuch new and intereſting diſcoveries in the various branches of ſcience, and in arts and manufactures, and alſo of all ſuch new and uſeful mechanical improvements as ſhall be made; and a room ſhall be ſet apart in the inſtitution, where all ſuch information will be lodged, and where it ſhall be kept for the ſole and excluſive uſe and inſpection of the proprietors and ſubſcribers, and where no ſtranger will ever be admitted.

APPENDIX.

DOMESTIC.

ARTICLE I.

THEORY OF HAIL.

Induction of Facts from the Phenomena of HAIL *and* HAIL-STORMS, *to eſtabliſh Mr.* Mitchill's *Theory of Peſtilential Fluids. In a Letter to Dr.* L. Valentin, *of Cape François, now of Montpellier, dated Plandome, June* 20, 1796.

FROM your letter, dated Norfolk, June 8, 1796, I am very glad to learn you are of opinion, that "the nature of contagious effluvia, or miaſmata, is ingeniouſly explained by the chemical combination of ſepton, or nitrogene, with the matter of heat and oxygene;" and that the facts occurring in the Eaſt-Indies, in the Weſt-Indies, on the coaſt of Africa, and, in ſhort, every where between the tropics, coincide perfectly in ſupport of the principle; yet I own, when I read that Meſſrs. Retz and Pratalongo pointedly deny the influence of air and marſh effluvia in producing fevers, my ſurprize is much greater than that Mr. Ramel ſhould doubt of the utility of meteorological obſervations in the art of phyſic.

It appears to me they have all taken up their opinions haſtily. There are occurrences enough to evince, that many atmoſpherical changes are brought about by the ſame agents, which work memorable effects upon the human body. And, notwithſtanding all that has been ſaid or done by thoſe gentlemen, I am ſtill firmly convinced, that aëriform vapours or exhalations are of mighty efficacy upon animal bodies, and that meteorological regiſters may be of ſome uſe.

In my anſwer to Chancellor Livingſton's letter of the 20th of February, 1796, I endeavoured to ſhow, that the peſtilential compoſitions of ſepton (azote) with oxygene, were decompounded by plants, and that while the principle of putrefaction remained in the vegetable economy as a nutritive ma-

terial, the principle of acidity was discharged, to renew and restore purjty to the atmosphere. In this way, I suppose, the operation of door dirt, street manure, stable dung, &c. may be accounted for, as far as those ingredients were concerned.

But there is another point of view in which this matter has presented itself to me. Septous compounds, formed near the surface of the earth, are not more conducive to the *nourishment and growth of vegetables*, than, in the upper regions of the air, they minister to the *production of hail*.

It has been pretended, that the septous and oxygenous airs which compose the earth's atmosphere, exist perpetually in a state of chemical union, because, as they are of different specific gravities, they would otherwise, it is said, separate from each other, and pure oxygenous gas, whose weight is as 0,50694, remain below, while unmixed septous air, whose gravity is as 0,44444, floated above. But if any person will attend to the experiments made by Priestley (2 Exp. and Obs. p. 441, & seq.), on the mixture of different kinds of air that have no mutual action, he will find, that when two kinds of them have been mixed, it is not possible to separate them again, by any method of *decanting*, or pouring them off, though the greatest possible care be taken in doing it. "They may not *incorporate*" so as to form a "*third species of air*," possessed of new properties; but "they will remain equally *diffused* through the mass of each other;" and whether it be the upper or the lower part of "the air that is taken out of the vessel, without disturbing the rest, it will contain an equal mixture of them both." He found this to be the case with inflammable and nitrous air, nitrous and common air, and nitrous and fixed air; and observes, that the phlogisticated and dephlogisticated airs which compose the atmosphere, are of very different natures, though without any known principle of attraction between them, and also of very different specific gravities; and yet they are never separated but by the chemical attraction of substances, which unite with the one, and leave the other, &c.

Such a mechanical mixture between the component parts of the atmosphere, thus seems to prevail, higher than breathing animals have hitherto ascended into it.

Notwithstanding the mention made of Mr. De Luc's meteorological observations upon the mountains of Switzerland, leading to an entire new theory of rain, and standing in direct opposition to the former theory of *dissolution* (Review of ori-

ginal German books, No. I. p. 73.), I feel myſelf ſatisfied in thinking, with Hamilton (Eſſays on the Aſcent of Vapours, &c.), Hutton (Theory of Rain), and Prieſtley (2 Exp. and Obſ. p. 34, & paſſim), that, in the ordinary condition of things, the gaſeous fluids of the atmoſphere all do contain water, or that water enters into their conſtitution. By means of this connection, water, though 800 times heavier than air, may be elevated conſiderably higher than the higheſt land of the globe. If the air loſes its attractive power for the water, the latter is precipitated in the form of rain, cloud or miſt; and if the region where this decompoſition happens, be cold enough, the water will be converted to ſleet, ſnow, or hail.

Beſides this depoſition of water from its chemical union with the atmoſpherical gaſes, nature has provided another proceſs, by which water may be produced. This is by the operation of electricity upon hydrogenous and oxygenous airs.

It has been found by Lavoiſier, Seguin, Jacquin, and their aſſociates, that ſparks ſent through inflammable and dephlogiſticated airs, in proper proportions, convert the whole of them into pure water. And it has been aſcertained by Cavendiſh and others, that if a quantity of ſeptous (azotic) gas is preſent with the other two, there is frequently generated a quantity of nitrous acid. The production of this acid, from the commixture of the three airs in the apparatus, has, indeed, been objected to by ſome perſons as inconcluſive or fallacious; but, I think, without reaſon. That this nitrous acid ſprung from the ſeptous (azotic) air preſent in this experiment, I hold for certain. And thus, in the pneumatic machine, mere water was yielded when the two airs were exploded together, and ſeptous (nitrous) acid when the third was added.

Bergman has confirmed (analyſis aquar. § 4.) the experiments of Margraaf, that rain-water is generally contaminated with ſeptous (nitrous) acid, and that even ſnow-water contains ſome ſlight veſtiges of it.

From the violence, copiouſneſs, and *rapidity* of electrical flaſhes in the clouds, during the prevalence of thunder-ſtorms, there, doubtleſs, is generated a quantity of water from the exploſion of oxygenous and hydrogenous airs in the higher parts of the atmoſphere, quite ſimilar to what happens artificially in the chemical reſervoirs. And as ſeptous air is there abundantly preſent, the formation of the ſeptous acid is, in like manner, very readily accounted for. And thus, if combinations between ſepton and oxygene are good manure, as I have

endeavoured to ſhow, then may a probable conjecture be formed of the final cauſe of lightning happening frequently as it does, in that ſeaſon of the year when plants are growing moſt luxuriantly; to wit, to prepare a manure or fertilizing ſubſtance, which ſhall gently deſcend with the rain, and be diſtributed to the whole vegetable creation, in ſtrength and quantity proportioned to their wants. Thus, though the old idea of *nitre*, formed and floating in the air, is not well founded, yet there are facts enough to evince the preſence of its *acid*.

Strong ſeptous (nitrous) acid, though, when mixed with common water, it produces a great degree of heat, yet, when mixed with ice or ſnow, produces a vaſt degree of cold, inſomuch as to have given riſe to the converſion of that tickliſh fluid quickſilver, into a malleable metal. Such immenſe congelation which was known to Fahrenheit, as long ago as the year 1729, was carried ſo far by Braun, in 1759, by mixing nitrous acid with pounded ice, and with ſnow, as to render mercury ſolid.

The moſt violent and deſtructive hail-ſtorms we feel in New-York are in the ſummer time, generally in June, July, and Auguſt, when the heat is greateſt. They are generally accompanied with black clouds, lightning, and ſtrong guſts of wind, which paſs, in narrow ſtreaks, over a conſiderable length of country. Their duration is very ſhort; but the number and weight of the icy maſſes which fall, are ſufficient, ſometimes, in three minutes, to do exceſſive damage.

From obſervations made on the Cordellieras of Peru, it appears (2 St. Pierre, *Etudes de la Nature*, p. 252.) that the height of 2500 French toiſes above the level of the Pacific Ocean, is the region of perpetual froſt, even under the rays of an equatorial ſun. In the latitude of 41 or 42 degrees north, the altitude of continual ice and froſt, on the Continent, is probably not ſo great by ſeveral hundred fathoms. I ſuppoſe the region of permanent congelation begins in theſe parallels, at ſomewhat more than 10,000 feet over our heads; and this opinion is countenanced by accounts given of the bald-topped white mountains of New-Hampſhire. (3 Belknap's Hiſtory, &c.)

To whatever cauſe the coldneſs of theſe upper tracts of atmoſpheric ſpace is owing, whether to remoteneſs from the earth's ſurface, or to tenuity through want of compreſſion, or to any other thing; this we know indubitably, that the moſt

elevated peaks of the loftieſt mountains of the globe are covered by ſnow and ice. The water from which theſe froſty collections were formed had been elevated to a height conſiderably above their ſummits, in combination with air, and by mixture of various atmoſpherical ſtrata or columns with each other, had been diſcharged in a fluid form, and afterwards hardened to cryſtals in its deſcent. And thus it is evident, while the connection between air as a menſtruum, and water as a ſolvent, laſts, the latter may be raiſed above the region of inceſſant freezing, and there be diſengaged in liquid drops, whenever the concurring circumſtances favour its precipitation.

"How immenſely cold," ſays Franklin (Meteorological Conjectures, &c.), "muſt be the original particle of hail which forms the centre of the future hail-ſtone; ſince it is capable of communicating ſufficient cold, if I may ſo ſpeak, to freeze all the maſs of vapour condenſed around it, and form a lump of perhaps ſix or eight ounces in weight!"

If water is precipitated in ſmall drops, from its ſolution in air, at any height above the region of ſettled congelation perpendicular over us, it will, in the firſt moments of its fall, be probably changed to ſnow; and the flakes of this, as they arrive at lower and warmer ſtrata of air, will be thawed to water again. This is, perhaps, a common occurrence during the warmeſt days of ſummer.

But during the prevalence of our hotteſt weather, pieces of ice, too large and too cold to be melted by paſſing through the heated inferior ſpaces of the atmoſphere, do now and then reach the earth, and remain thereon a conſiderable time before they undergo liquefaction. The queſtion is, What is the immediate cauſe of this phenomenon?

I am prone to believe, that if the flakes of ſnow, before melting, meet with ſeptous acid in the elevated tracts of atmoſphere, the two ſubſtances will act upon each other, as in Fahrenheit's and Braun's experiments, and liquefy; but, during this liquefaction, they will abſorb, in proportion to the quantities of the two materials melting in a given ſpace, an extraordinary quantity of ſenſible heat from the neighbouring objects, and convert it into a latent ſtate; or, in other words, while the ſnow is paſſing to a liquid form, a prodigious degree of cold will be generated.

The experiments already referred to, give us ſufficient proof of the intenſeneſs of the cold produced by mixing ſnow and ni-

trous acid together. Shall ſuch a mixture, which, under favourable circumſtances and artificial management, can congeal quick-ſilver, not be capable, in a natural proceſs, of conſolidating even water into bits of ice, at the height of ten or twelve thouſand feet in the air?

A bare inſpection of a hail-ſtone is ſufficient to ſatisfy the examiner, that the original ſnow-flake, which may be imagined to have conſtituted its nucleus, had been partly, if not wholly, melted before it aſſumed the form of hail. This is alſo apparent from the conſideration, that ſnow-flakes are naturally formed in beautiful and regular cryſtals; and when they deſcend to earth, through an atmoſphere cold enough to prevent their melting, as happens in the winter time, the figured and elegant ſtructure they firſt aſſumed in freezing continues unaltered in ſtill weather, until they alight upon the ground. And further, as there is no inſtance, at leaſt that I know, of water being precipitated from its ſolution in air, in diſtinct drops of ſeveral ounces; but, on the contrary, as it is always ſeparated into ſmall globules, a requiſite to the aggregation and conſolidation of theſe into a large bit of ice is, that between the formation of the original ſnow-flakes and the ſubſequent hail-ſtones, there ſhould have been an intermediate ſtate of liquidity.

Experiments, already made, have evinced (78 Philoſophical Tranſactions, &c.), that when air is mechanically compreſſed, heat is extricated from it; and when the ſame fluid is mechanically dilated or rarefied, heat is abſorbed, or, in other words, cold is produced. The fountain of Hiero, conſtructed on a large ſcale at the Chemnicenſian mines in Hungary, proves the power of air, thus expanded or rarefied, to generate cold. In this machine, wherein the air of a large veſſel is compreſſed by a column of water 260 feet high, a cock may be ſuddenly opened, and as the condenſed air ruſhes out with great violence, and becomes inſtantly very much expanded or dilated, ſo much cold is produced, that the moiſture iſſuing forth with it is frozen, and falls down in the form of ſnow; and, at the ſame time, the nozzle of the cock becomes incruſted with ice. Thus, if mechanical dilation or expanſion ſhould exiſt in the atmoſphere during a guſt of hail, and conſpire with the chemical action of ſeptous acid upon ſnow, the frigorific effect, in ſuch caſes, will be proportionably greater. And this I take to be the fact.

If it is now underſtood how intenſe cold is produced dur-

ing the melting of ſnow, on its mixture with ſeptous acid, and that too during a ſparſe or attenuated ſtate of the atmoſphere, there muſt neceſſarily be a converſion to ice, of a correſponding quantity of water in the vicinity of thoſe operations; and, according to the quantity of ſnow liquefied, the elevation above the earth, the frequency and rapidity of the lightning, &c. will be the amount of hail, the ſize of the lumps, the proportion of rain falling with it, &c. &c. I ſhall juſt add, it is a remark of ſome ancient weather-wiſe people, that a certain *greeniſh* look of the clouds ſometimes forebodes or accompanies hail.

To recapitulate: 1. Water may be precipitated from the air, and fall to the earth through ſpaces warmer than 32 of Fahrenheit's ſcale, as in the rain-drops of common low ſhowers: or, 2. It may be diſengaged, and, in ſome part of its deſcent, paſs through a region colder than 32 deg. whereby the ſeparate globules will be frozen to flakes in mid-air, as in ordinary cryſtals of gently-falling ſnow: or, again, 3. It may, after being ſevered from its connection with air, be converted to ſnow-flakes, which, meeting with ſeptous acid, may be melted thereby, and, eſpecially if a ſudden rarefaction ſhould happen at the ſame time, may produce a degree of cold extreme enough to freeze all the water in the neighbourhood, and form hail-ſtones of the greateſt magnitude.

Before I conclude I ſhall mention a few other particulars which have occurred to me ſince the preceding part of this letter was written. Muſſchenbroeck, (Philoſoph. Natural. § 12 49.) has the notion of *ſpirit of nitre* augmenting the cold, by acting upon the conglaciating particles in the air, during the hail-ſtorms of Europe; the worſt of which, wherein maſſes, weighing from eight ounces to a pound weight, have fallen to the ground, have happened in ſummer, and have been attended with a dark and raging tempeſt, and terrible thunder and lightning. De Sauſſure (Eſſais ſur l'Hygrometrie, p. 389.) affirms, that hail is always accompanied by electricity in the atmoſphere, and that he never knew the former to happen, without his electric conductor giving decided tokens of the preſence of the latter, in a form either poſitive or negative. And Bomare remarks (Dictionare d'Hiſt. Nat. art. Salt-petre), it is a matter already known, that fogs are very favourable to the formation of nitre.—The quantity of acid produced may ſometimes be too great for the mere nutriment of vegetables. Its action may be violent enough to injure their health, or even to deſtroy their lives.

The *ſharp* and *acrid* rain which, as Mr. Holm relates, fell in Iceland, during a remarkable fiery eruption from the earth in 1783, was of a peſtilential quality, and ſeemed to penetrate the very bodies of the cattle. Their hoofs became white; their hair fell off, and they were covered all over with puſtules and ulcers. And theſe uncommon phenomena were no leſs deſtructive to the human ſpecies. It occaſioned ſevere pain on the hands and feet where it fell. During ſuch extraordinary commotions in the earth and the atmoſphere, *hail of an uncommon ſize*, and ſnow, were ſometimes obſerved to fall, and evident cold was felt where theſe things took place. This cauſtic and penetrating rain extended to Drontheim, and was felt in other parts of Norway: it was experienced too in the Ferro Iſlands, burning, as it were, the leaves of the trees, and reducing the graſs in the fields to a blackiſh or coaly appearance. Feebler effects were felt in Germany, Holland, and other parts of Europe. From this aſſemblage of phenomena in the neighbourhood of the volcanic eruption, there is great reaſon to believe, that a combination of ſepton (azote) with oxygene took place in or about the ſpots where the thunder and flames agitated the atmoſphere moſt violently. It is rather to be regretted, that Mr. Holm had not exactly aſcertained a point ſo eaſily ſuſceptible of experimental proof at that time: but the phenomena are ſo nearly like thoſe which are induced by ſeptic acid in other caſes, that the corroſive quality of the atmoſpheric water, the eroſion of the leaves of trees, the ſickening of men, as well as of birds, dogs, cats, guinea-pigs, &c. which happened in New-York during the prevalence of their peſtilence, induced by ſubſtances putrefying on the ſpot, and evolving the ſame kind of noxious fluid, *all* point to a ſimilar modification of the atmoſphere in both inſtances. The chief difference in the caſes is this: in Iceland the ſepton and oxygene of the atmoſphere were brought into union by electric exploſion; in New-York the two elements formed a connection during the proceſs of *corruption* in the animal and vegetable ſubſtances which contained them: in both modes ſeptic acid was produced. Why then ſhould not the peſtilential condition of the atmoſphere of Iceland be owing to the ſame cauſe as that of the cities of America? This interpretation pleaſes me the more, as it reconciles the leading principle of my inquiry with the learned and ingenious reſearches of N. Webſter, Eſq. in his elaborate work on epidemic and peſtilential diſtempers.

I entertain a hope, that our ſociety at Cape François will one day be re-eſtabliſhed, and that you will be enabled to com-

pare this explanation with the facts occurring in St. Domingo. You will then, if you find it insufficient, lend a helping hand yourself in solving the paradox, wherefore the largest hail falls during the hottest weather.

I am,

Yours with affectionate regard,

SAMUEL L. MITCHILL.

Plandome, June 20, 1796.

Dr. VALENTIN.

ARTICLE II.

NAUTICAL IMPROVEMENT.

THE subscriber, Captain of the brig Schuylkill, of this port, having, in two voyages to the West-Indies, experienced the salutary effects of a patent machine for expelling the foul air from the holds of ships, invented by Benjamin Wynkoop, of Philadelphia, and constructed in said brig, doth certify, that the same machine, worked by the motion of the vessel at sea, forced a constant current of pure air into the hold, from whence the foul air was thereby expelled; that the seamen were remarkably healthy; no disagreeable smell was perceived from the bilge-water or provisions; the vessel's stores, particularly the liquors, were much cooler than common; and the paint in the cabin not discoloured, as usual in West-India voyages.

As a friend to trade and navigation, the subscriber thinks it his duty to recommend the machine to general use; and from the facts, as stated above, he fully believes it may be the means of preserving the timber of ships, and their perishable cargoes, from the destructive effects of foul air confined in the holds of ships, and of contributing to the health and comfort of passengers and seamen on board.

(Copy.) GEORGE IRWIN.

Philadelphia, May 25, 1797.

I HAVE examined the principle of construction, and witnessed the operation, of Mr. Benjamin Wynkoop's ventila-

tors, on board of ſeveral veſſels in which they have been conſtructed, and am of opinion they will be of great advantage in preſerving the health of the people in ſhips, and the timber from rotting, by the expulſion of foul, and the conſtant circulation of freſh air which they produce. Several maſters of veſſels have informed me, that theſe ventilators have alſo prevented the ſtaining of the paint in the cabin, which they frequently obſerved to take place from the exhalations ariſing from bilge-water, ſugar or molaſſes. I, therefore, earneſtly recommend their conſtruction on board of every veſſel, and candidly declare, I do not know any of the late improvements, in the art of preſerving health on board of ſhips, of half the importance, whether they reſpect economy, eaſe in execution (being worked by the motion of the veſſel), or efficacy.

JAMES MEASE,
Reſident Phyſician of the Port.

Health-Office, State-Iſland, May 26, 1797.

THE ſubſcriber, late Captain of the brig Nancy, of this port, having, in a voyage to the Weſt-Indies, experienced the ſalutary effects of a patent machine for ventilating the holds of ſhips at ſea, invented by Mr. Benjamin Wynkoop, and conſtructed in ſaid brig, doth certify, that the ſaid machine, worked by the motion of the veſſel at ſea, forced a conſtant current of pure air into the hold, from whence the foul air was thereby expelled; that the ſeamen were remarkably healthy, when the crews of moſt of the other veſſels, at the port where the ſaid brig diſcharged her cargo, were very ſickly, and many of them died: no diſagreeable ſmell was perceived from the proviſions or bilge-water: the veſſel's ſtores, and particularly the liquors, were better preſerved, and cooler than common; and the paint in the cabin not diſcoloured, as uſual in Weſt-India voyages.

As a friend to trade and navigation, the ſubſcriber thinks it his duty to recommend this machine to general uſe; and from the facts, as ſtated above, he fully believes it may be the means of preſerving the timber of ſhips, and their periſhable cargoes, from the deſtructive effects of foul air confined in the holds of ſhips, and of contributing to the health and comfort of the paſſengers and ſeamen on board.

January 5, 1798. HENRY GEDDES.

THE machines invented by Mr. Benjamin Wynkoop, for ventilating ſhips, may juſtly be numbered with the moſt important nautical improvements.

The ſimplicity, durability, and compact ſtructure of the machines, are peculiarly adapted to the purpoſe for which they were deſigned; and their conſtant vibration, produced by the motion of the ſhip alone, will keep the air in free circulation, throughout the remoteſt parts of the ſhip.

Thoſe who are immediately acquainted with the injurious effects of foul air on the health of the perſons on board ſhips, and on periſhable cargoes, as well as the frames of the ſhips, will juſtly appreciate their worth. It excites aſtoniſhment that a ſubject of ſuch magnitude ſhould have been ſo long neglected, when we take into view the ſtill more important conſideration of the fatal effects produced by the introduction of peſtilential diſeaſes into our ports. Thoſe diſeaſes, in many inſtances, are doubtleſs generated on board of ſhips (not ventilated), by the putrid exhalations from periſhable materials on board, which are ultimately diſcharged on our ſhores, and, like Pandora's box, ſpread diſeaſe and deſolation through our flouriſhing cities.

Theſe remarks are the reſult of the beneficial effects experienced from two ſuch ventilators, on board of the brig Benjamin Franklin, on her late paſſage from Bourdeaux. Her cargo was altogether wines, near 800 hogſheads of which were claret wines: it is ſubject to fermentation, and, conſequently, very conſiderable loſs. The cargo was landed in the moſt perfect order, perhaps, ever witneſſed on a ſimilar cargo—after filling up the caſks the loſs did not exceed one and a half per cent.

By the operation of the ventilators the hold was kept perfectly cool, the bilge-water free from ſmell, and the paint-work not in the leaſt diſcoloured.

On the voyage previous to the conſtruction of the ventilators on board, the reverſe of all this was the caſe, and only 90 hogſheads of wine on board.

Theſe obſervations have been prompted by a deſire to promote the public good and the intereſts of commerce.

April 2, 1798. LLOYD JONES,

Maſter of the brig Benjamin Franklin.

☞ *Two ventilators, which are amply ſufficient for any ſhip, will not occupy the ſpace of four barrels of flour.*

TWO machines for ventilating the holds of ſhips, invented by Mr. Benjamin Wynkoop, were fixed in the ſhip India; one of which being in my ſtate-room, was more immediately under my obſervation, and I found that it was worked by the motion of the ſhip at ſea, at all times, during a voyage from this port to Batavia. It is therefore my opinion, that the general uſe of this machine would be the great means of preſerving the timber of ſhips, and their periſhable cargoes, from decay, and of contributing to the health and comfort of the people on board.

Philadelphia, Feb. 9, 1799. JOHN ASHMEAD.
Captain of the ſhip India.

Ship Aſia, Delaware Bay, April 8, 1799.

Mr. BENJAMIN WYNKOOP.

Sir,

THE hurry of buſineſs, and my ſhort ſtay in Philadelphia, prevented my informing you of the particulars relative to your improved nautical ventilators. While the ſhip Aſia lay in Batavia roads, I kept one of my people working the foremaſt ventilator, which he did with a cord faſtened to the ring in the front of the machine, and ſet on a cheſt in the fore-caſtle, where it was kept working, alternately, every other half hour in the courſe of the day, while diſcharging and lading; by means whereof there was a conſtant current of air interchanging in the ſhip's hold; and I was aſtoniſhed at the preſſure of air diſcharged, while working in the manner above related, as I paſſed and repaſſed frequently in the wake of the ventilator, and found it perfectly cool and pleaſant; and I can vouch for the utility of the ſame, as I am confident our crew, ſhip and cargo, have felt the ſalutary effects of thoſe machines, both at ſea and in port, where they were attended to.

I remain, Sir, with reſpect,
Your obedient ſervant,
THOMAS MORGAN,
Maſter of ſhip Aſia.

FOREIGN.

ARTICLE I.

Deſcriptive Account of a new Method of treating old Ulcers of the Legs. By Thomas Baynton, *Surgeon of Briſtol.*

[From Duncan's Annals of Medicine for 1798.]

THE common methods of attempting the cure of old ulcers are, as Mr. Baynton juſtly obſerves, tedious, troubleſome, and uncertain: beſides which, they often become dangerous in their conſequences. It muſt, therefore, be admitted, that any attempts, calculated to leſſen the ſufferings of the patient and the trouble of the ſurgeon, are well entitled to attention.

Mr. Baynton aſſerts, that the means which he here propoſes will, in moſt inſtances, be found ſufficient to accompliſh cures in the worſt caſes, without pain or confinement. Thus the poor man may be enabled to procure his family ſuſtenance, while he purſues the means that are calculated to reſtore him to health.

About the commencement of the year 1792, Mr. Baynton, after having experienced repeated diſappointments in the cure of old ulcers, for which he had tried every remedy, both external and internal, recommended by the moſt eminent practitioners, determined on endeavouring to bring the edges of theſe ulcers, that might in future be placed under his care, nearer together, by means of ſlips of adheſive plaſter. To this he was chiefly led from having frequently obſerved, that the probability of an ulcer continuing ſound depended much on the ſize of the cicatrix that remained after the cure appeared to be accompliſhed, and from well knowing that the true ſkin was a much more ſubſtantial ſupport and defence, as well as a better covering, than that frail one which is obtained by the aſſiſtance of art. But when he had recourſe to the adheſive plaſters with the view of leſſening the probability of thoſe ulcers breaking out again, he little expected that an application ſo ſimple would prove the eaſieſt, moſt efficacious, and moſt agreeable means of treating ulcers.

Although the firſt caſes in which Mr. Baynton tried this practice were of an unfavourable nature, yet he had ſoon the

ſatisfaction to perceive, that it occaſioned very little pain, and materially accelerated the cure, while the ſize of the cicatrices were much leſs than they would have been, had the cures been obtained by any of the common methods.

At firſt, however, his ſucceſs was not quite perfect; as, in many inſtances, he was not able to remove the ſlips of plaſter, without removing ſome portion of the adjacent ſkin, which, by occaſioning a new wound, proved a diſagreeable circumſtance, in a part ſo diſpoſed to inflame and ulcerate, as the vicinity of an old ſore. He therefore endeavoured to obviate that inconvenience, by keeping the plaſters and bandage well moiſtened with ſpring-water, for ſome time before they were removed from the limb. He had ſoon the ſatisfaction to obſerve, that the inconvenience was not only prevented, but that every ſucceeding caſe juſtified the confidence he now began to place in the remedy. He alſo diſcovered, that moiſtening the bandages was attended with advantages which he did not expect. While the parts were wet and cool, the patients were much more comfortable in their ſenſations, and the ſurrounding inflammation was ſooner removed than he had before obſerved it to be.

By the mode of treatment here recommended, Mr. Baynton found, that the diſcharge was leſſened, the offenſive ſmell removed, and the pain abated in a very ſhort time. But beſides theſe advantages, he alſo found that the callous edges were, in a few days, levelled with the ſurface of the ſore; that the growth of fungus was prevented, and the neceſſity of applying painful eſcharotics much leſſened, if not entirely done away.

As the ſucceſs of the means here employed very much depends on the mode of their application, he very properly gives a minute deſcription of the method of procedure which he would recommend.

The parts, he tells us, ſhould firſt be cleared of the hair, which is ſometimes found in conſiderable quantities upon the legs, that the dreſſings may be removed with eaſe, at each time of their renewal, which, in ſome caſes, where the diſcharges are very profuſe, and the ulcers very irritable, may, perhaps, be neceſſary twice in twenty-four hours, but which, in almoſt every inſtance, he has been under the neceſſity of performing only once in that ſpace of time.

The plaſter ſhould be prepared for ſpreading, by melting, in an iron ladle, over a ſlow fire, four ounces of common, or

litharge plaſter, with half a drachm of yellow reſin. When melted, it ſhould be ſtirred till it begins to cool, and then ſpread thinly upon ſlips of ſmooth porous calico, of a convenient length and breadth, by ſweeping it quickly from the end that is held by the left hand of the perſon who ſpreads it to the other end, held firmly by another perſon, with the common elaſtic ſpatula that is uſed by apothecaries. The uneven edges muſt then be cut off, and the pieces ſo prepared cut into ſlips of two or three inches in breadth, and of a length that will leave, after being paſſed round the limb, an end of about four inches.

The middle of the piece ſo prepared ſhould then be applied to the ſound part of the limb that is oppoſite to the inferior part of the ulcer, ſo that the lower edge of the ſlip may be placed about an inch below the edge of the ſore; and the ends ſhould then be drawn over the ulcer, with as much gradual extenſion as the patient can well bear. Other ſlips ſhould be ſecured in the ſame way, each above the other, until the whole ſurface of the ſore and limb are completely covered with the adheſive ſtraps, at leaſt an inch above and below the diſeaſed part.

The whole of the affected part ſhould then be defended with pieces of ſoft calico, three or four times doubled, and very evenly applied; and a calico bandage, of about three inches in breadth, and four or five yards in length, or rather as much as will be ſufficient to ſupport the limb, from the foot to the knee, ſhould be applied with as much firmneſs as can be borne by the patient, and as much evenneſs as can be obtained by the attention of the ſurgeon, by paſſing it firſt round the leg at the ancle-joint, then once or twice round the foot, and afterwards up the limb, till it reaches the knee; obſerving that each turn of the bandage ſhould have its lower edge ſo placed as to be about an inch above the lower edge of the fold next below.

The whole of the parts that are at all affected ſhould then be well moiſtened with cold ſpring-water, poured from a large tea-pot; and if the parts be much inflamed, or the diſcharge profuſe, this ſhould be renewed as often as the heat of the parts may indicate, or, perhaps, at leaſt once in every hour.

The patient may then take what exerciſe he pleaſes; as it will generally be found, that they are eaſier when they walk much, and that their cures are not retarded, but, in moſt inſtances, accelerated by their exertion in that way.

Mr. Baynton has chosen to apply the means here recommended at an early hour in the morning, that is, before the œdema has come on, which frequently attends cases of this kind; first, with the view of restoring the tone of the refluent vessels, by supporting their sides when in a natural state; and, secondly, with the expectation of being able to bring the divided edges nearer together, while the parts are all in that situation, and the skin relaxed, than it would be possible to do when the parts are distended by tumefaction.

He prefers the use of calico to linen, from much experience of its superiority in many respects. It does not, he tells us, subject the parts to that inconvenient and undue stricture which is experienced from the use of linen. It is more pervious, and, consequently, prevents the formation of sinuses, which might be occasioned by a complete retention of the discharges, if accompanied with the pressure so much recommended. It appears to possess more of the accommodating properties of the true skin; and, by its elasticity, it is well calculated to yield a little to muscular action, while it affords sufficient support to the parts.

For a bandage, too, as well as for the plasters, Mr. Baynton thinks cotton much preferable either to linen or flannel: it is more elastic, soft, and yielding, than the former; and, besides being less cumbrous and more cleanly than the latter, it possesses also, he thinks, the additional advantage of being a much better conductor of that morbid heat which so constantly affects inflamed parts, and which it is essential to remove.

Mr. Baynton having thus described his mode of practice, and explained the principles by which he was directed, next proceeds to give proofs of its success, by presenting us with an account of several deplorable cases, which were cured by this means, after the complete failure of several others. Six cases are here minutely related, in which this practice appears to have been attended with remarkable success. Without entering into a particular detail of these, it will here be sufficient to mention the following conclusions, which Mr. Baynton draws from them. The first, third, and fourth cases prove, he thinks, that deep old ulcers, situated in yielding parts, may, by the means recommended, have their sides brought into contact, and be cured almost as readily by the second intention as recent wounds, with very little remaining scar, and, consequently, with a diminished probability of relapse. But he considers the second, fifth, and sixth cases, as going much farther,

and as eſtabliſhing the ſuperiority of this method over every other that has yet been known: for they prove that ſpeedy cures may be obtained in the worſt and oldeſt ulcers of the pooreſt people, even while the true ſkin cannot be brought forward, ſo as, in any degree, to cover the denuded parts.

After ſtating theſe concluſions, Mr. Baynton propoſes it as a query, To what circumſtances are we to aſcribe theſe remarkable effects? From much ingenious reaſoning, he clearly ſhows, that they cannot be referred to the ingredients of the adheſive plaſter, to the effects of the bandages, to the exerciſe that was uſed, nor to any conſtitutional interference, as the ſame effects have always followed the application of theſe principles, whether the patients have been young or old, robuſt or emaciated, temperate or diſorderly; while ointments, compoſed of the ſame ingredients as the adheſive plaſter, bandages, exerciſe, and all the means, except the endeavour to bring the divided parts nearer together, had been tried in every different way without any advantage. But from taking a view of the proceſs of nature, in accompliſhing the cure of divided parts, as deſcribed by Mr. John Hunter, and other diſtinguiſhed writers, Mr. Baynton thinks it is rendered highly probable, that a great part of the advantages which have been obtained by this practice depend on aſſiſting and imitating nature, by mechanically contracting the granulations, obliterating the extreme veſſels, and overcoming the reſiſtance oppoſed to the proceſs of ſkinning, which are the natural conſequences of the application of the adheſive plaſter, in the way that he has recommended.

ARTICLE II.

Account of the FRENCH AEROSTATIC INSTITUTE.

THE Aeroſtatic Inſtitute, founded by the Committee of Public Safety, and enveloped in the moſt profound ſecrecy, at Meudon, to which alſo was added a camp for the exerciſe of the artillery, is even yet looked upon as a ſecret arrangement of the Republic, reſpecting which the greateſt precautions are taken; the doors being ſhut againſt the public and all foreigners.

It was impoſſible to have ſelected a more convenient ſpot

for the eſtabliſhment of the Aeroſtatic Inſtitute than the Royal Lodge of Meudon. From its elevated ſite on a mountain, it commands a beautiful and extenſive proſpect over a plain covered with villages and cultivated fields, interſected by the Seine, and terminated by the city of Paris.

The perfection and the rational application of aeronautics are the objects of the labours of this eſtabliſhment, to which the celebrated natural philoſopher, Guyton Morveau, has, in particular, rendered the moſt important ſervices. But the inſtitution ſtood in need of ſuch a director as Conte, for whom Guyton Morveau has procured the appointment. With a love of the ſcience, Conte unites a penetrating genius for reſearch and invention, accompanied by indefatigable aſſiduity.

The corps of aeronauts, intended to ſerve in the armies of the Republic, and conſiſting of fifty courageous youths, is trained at the ſchool of Meudon: it is there the balloons are prepared which are ſent off to the armies; and every day in the ſummer the pupils are employed; at one time in performing their exerciſes, at another in making reſearches in natural philoſophy, with a balloon which is kept conſtantly filled for the purpoſe.

The improvement of the preparation of the balloon, the diſcovery of a new mode of filling it with inflammable air from the ſubſtance of water (hydrogen gas), diſcovered by Lavoiſier, the invention of a new telegraph, connected with the balloon, are the principal advances which have been made in aeroſtatics at Meudon, under the direction of Conte.

The old lodge of Meudon ſerves as a manufactory for the preparation of the balloons, and of all the apparatus neceſſary to accompany them to the armies. The new lodge is appropriated to the inſtitute, and to the accommodation of the pupils, and of the Director and his family. There were prepared the Entreprenant for the army of the north, by means of which the hoſtile army was reconnoitered at the battle of Fleurus; the Celeſte for the army of the Sambre and Meuſe; the Hercule and the Intrepide for the army of the Rhine and Moſelle.

The ſilk for the balloons is manufactured at Lyons, and is very thick and ſtrong; and Conte has rendered them much more durable by the precaution of only varniſhing the outer ſurface. The varniſh is of an excellent quality; it ſufficiently hardens the outſide, and makes the ſilk ſtick together when the balloon is folded. Moreover, experience has proved that

the inner coat of varniſh cannot reſiſt the operation of filling the balloon, that it is corroded by the gas, and that this friction renders the ſilk flabby.

The filling of the balloon with hydrogen gas is the reſult of the diſcoveries made by the great Lavoiſier, and has for its baſis his important experiment of the decompoſition of water.

The gas is prepared by the following ſimple and unexpenſive proceſs:

Six or more hollow iron cylinders are ſet in brick work, beſide and over each other in a furnace, which may be conſtructed in twelve hours; and both ends of each cylinder are made to project from the furnace. The openings of theſe cylinders are ſtopped with ſtrong iron covers, through which metal tubes are let in. The tube, at one end, ſerves for pouring water, previouſly heated, into the cylinders when red-hot; that on the oppoſite ſide is deſtined to conduct the air which firſt preſents itſelf through a reſervoir filled with a cauſtic lixivium, and to convey it into the balloon. The cylinders are partly filled with coarſe iron-filings, which the exceſſive heat of the furnace, kept up with pit-coal during the whole time of the operation, reduces to a ſtate of excandeſcence. At this ſtage of the proceſs, the valve of one of the tubes of each cylinder is opened, and a ſmall quantity of boiling water is gently poured into the heated cylinder. As ſoon as the vapour of the water touches the heated iron, the two ſubſtances which compoſe the water are ſeparated: the one (the oxygen) attaches itſelf to the iron, which it calcines, and which, after the operation, is found partly cryſtallized, after the manner of volcanic productions: the other of the component ſubſtances of the water (the hydrogen) combines with a quantity of the igneous ſubſtance termed *calorique*, and becomes inflammable air (hydrogen gas), which continues in a permanent ſtate of elaſtic fluidity, and weighs ſeven or eight times leſs than the atmoſpheric air.

As the water contains a ſmall portion of the ſubſtance of *carbone (carbonique)*, which would render the air in the balloon heavy, the air, as it firſt ruſhes out of the cylinders, is made to paſs through a reſervoir of water, impregnated with a cauſtic alkali. This fluid attracts to itſelf all the *carbonique*, and nothing riſes into the balloon but very pure inflammable air.

During the operation, it has ſometimes happened that the cylinders, heated to excandeſcence, melted. To guard againſt

this accident, the projecting end of the cylinder is furniſhed with a pyrometer, and a ſcale which, by means of an iron rod, indicates the degrees of rarefaction of the air. A particular point on the ſcale announces the moment when the cylinders are heated in the degree neareſt to fuſion: when ſuch is the caſe the fire is immediately diminiſhed. The operation of filling a balloon of thirty feet diameter employs one third of a day.

The exerciſing balloon at Meudon is of a ſpherical form, and thirty-two feet in diameter. Its upper half is covered with a linen caſe, to keep off the rain from the balloon and its netting. This netting, woven with ſtrong cords, embraces the upper part of the balloon, and is deſtined to ſupport the car for the reception of the aeronauts. The balloon, kept conſtantly full and ready for aſcent, and expoſed in the open air in all weathers, preſerves its buoyant ſtation in the atmoſphere, being faſtened on the great terrace of the lodge. When the weather is favourable the aeronautic exerciſes are begun. The balloon is ſet free from its faſtenings, and elevated to a certain height; when the car is made faſt to the cords which hang down from the net: the whole of this is done in five minutes. A Colonel then mounts the car with one of the pupils, and the balloon riſes to the height, generally, of from a hundred and ſixty to two hundred and forty yards. The pupils ſeparate into diviſions, for the purpoſe of holding the balloon in the air, ſuffering it to mount, and drawing it down by means of three principal ropes, faſtened to the net, and ramified with ſeveral others: in theſe manœuvres they employ the aid of a capſtern. When the balloon has been newly filled, has yet ſuffered no evaporation, and ſtill retains all its force, it requires the ſtrength of twenty perſons to hold it; and in that ſtate it will bear eight hundred weight. After a ſpace of two months, though much evaporated, it is ſtill capable of bearing two perſons with their inſtruments, and even a conſiderable ballaſt, at the ſame height in the air: but then ten perſons are ſufficient to hold it.

The car is conſtructed of a light lattice work of wood, lined with prepared leather, and hangs about ſixteen feet beneath the balloon: it affords convenient room for two perſons ſeated oppoſite each other, with the neceſſary inſtruments for making obſervations.

The balloon aſcends as often in the day as is requiſite for the ſucceſſion of the obſervations which are to be made; but

theſe aſcents take place only in calm and ſerene weather.—Whenever any unforeſeen accident occurs, the aerial machine is hauled down in five minutes. In ſtrong guſts of wind, which ſuddenly ariſe, the aeronauts are always expoſed to ſome danger: the balloon, held by the ropes, cannot riſe freely; and its vibrations and fluctuation reſemble thoſe of a paper kite, which has not yet reached a certain degree of altitude. This ſpectacle, nevertheleſs, is more terrific to the ſpectator than to the aeronaut, who, ſeated in his car, which its own weight preſerves in a perpendicular poſition under the balloon, is but ſlightly affected by its deſultory motion. No inſtance of any unfortunate accident has yet occurred at Meudon.

All fear, every idea of danger, vaniſhes on examining the ſolidity of the whole apparatus, the precautionary meaſures, adopted with the moſt prudent foreſight, and the utmoſt ſecurity, and eſpecially when we are more particularly acquainted with the cool unaſſuming ſteadineſs of Conte, the director of the whole.

When the return of peace ſhall allow more leiſure, and ſhall favour the employment of this apparatus in other experiments than thoſe immediately connected with the military ſervice, we may expect to derive from it the moſt important and diverſified advantages to natural ſcience. The experiments will then be conducted under the direction of a committee of Naturaliſts, from the National Inſtitute, with a view of making diſcoveries in natural philoſophy, meteorology, and other branches. When the labours of the Aeroſtatic Inſtitute ſhall have accompliſhed ends ſo important to the arts, and of ſo great general utility, there will be printed a particular account of the eſtabliſhment, and of the courſe of experiment purſued: at preſent theſe matters are kept from the knowledge of the public.

The moſt recent invention of Conte, admirable for its ſimplicity and preciſion, is the aeroſtatic telegraph. It conſiſts of eight cylinders of varniſhed black ſilk, ſtretched on hoops, and reſembling thoſe little pocket lanterns of crimped paper, which draw out and fold down again on themſelves. Theſe eight moveable cylinders, each three feet in diameter, and of a proportionate length, are ſuſpended from the bottom of the car, connected together with cords, and hanging one above another, at the diſtance of four feet. By means of cords paſſing through the bottom of the car, the aeronautic obſervers

direct thoſe cylinders, give them different poſitions at will, and thus carry on their telegraphic correſpondence from the regions of the air.

Conte has further applied his thoughts to the invention of a ſimilar aeroſtatic telegraph, which, without the aſſiſtance of a great balloon, or an aerial correſpondent, ſhould be managed by a perſon ſtanding on the ground, by means of cords; the apparatus being ſuſpended to a ſmall balloon, of only twelve feet diameter.

Coutel, captain of the aeronautic corps, was the man who aſcended with the Entreprenant balloon, on the 26th of June, 1794, and who conducted the wonderful and important ſervice of reconnoitering the hoſtile armies at the battle of Fleurus, accompanied by an adjutant and a general. He aſcended twice on that day, to obſerve, from an elevation of four hundred and forty yards, the poſition and manœuvres of the enemy. On each occaſion he remained four hours in the air, and, by means of preconcerted ſignals with flags, carried on a correſpondence with General Jourdon, the commander of the French army.

His intended aſcent had been made known to the enemy, who, at the moment when the balloon began to take its flight, opened the fire of a battery againſt the aeronauts. The firſt volley was directed too low: one ball, nevertheleſs, paſſed between the balloon and the car, and ſo near to the former, that Coutel imagined it had ſtruck it. When the ſubſequent diſcharges were made, the balloon had already reached ſuch a degree of altitude as to be beyond the reach of cannon ſhot, and the aeronauts ſaw the balls flying beneath the car. Arrived at their intended height, the obſervers, remote from danger, and undiſturbed, viewed all the evolutions of the enemies, and, from the peaceful regions of the air, commanded a diſtinct and comprehenſive proſpect of two formidable armies engaged in the work of death.

On the Uſe of the Gaſtric Juice of Graminivorous Animals in the Cure of Ulcers. By Dr. John Harneſs, *Phyſician to his Majeſty's Fleet in the Mediterranean.*

MR. THOMAS CORBEN, boatſwain of his Majeſty's ſhip the Egmont, was, on the 31ſt of July, 1796, received into the Dolphin hoſpital-ſhip, with a ſcorbutic ulcer

on the right leg, the external ſurface of which was ſix inches in length, and four in breadth. The ſurrounding integuments were detached to a conſiderable diſtance, and their margin, with the much greater portion of the ſurface of the ulcer, in a ſphacelous ſtate. The diſcharge was ſo acrid as to deſtroy every part it came in contact with, and it had inſinuated itſelf through the whole length of the gaſtrocnemius and ſoleus muſcles. From between the muſcles which were detached from the bones, nearly the whole length of the ulcer, a very large quantity of moſt offenſive matter was diſcharged; a conſiderable portion of which lodged in a cyſt, formed by the detached integuments, on the exterior and interior part of the leg. There was very great tenſion of the whole length of the extremity, and the patient's general health was much impaired.

From the very unfavourable appearance of this caſe, and from being perſuaded that it would be found impracticable to effect a cure by any of the above-mentioned remedies, in which my own opinion was corroborated by that of Mr. John Gray, a very ingenious practitioner, and ſurgeon of the hoſpital-ſhip, I was induced to have recourſe to the gaſtric fluid of graminivorous animals, which I knew could be eaſily obtained from the bullocks and ſheep daily killed for the uſe of the fleet. A bullock being killed in the evening, near three pints of the fluid were obtained, with part of which the ſurface of the ulcer was waſhed, as were the whole of the ſinuſes, by injecting the fluid with a ſyringe. Superficial dreſſings of lint were then applied, and particular attention was paid to the application of bandages and compreſſes, that they might, as much as poſſible, prevent a further inſinuation of matter, as well as for the purpoſe of bringing and preſerving the parts as much in oppoſition as their diſeaſed ſtate would admit of, that every advantage might be derived from the adheſive inflammation which I expected this application would excite.

The third day after this application was begun, upon removing the dreſſings, the whole of the ſphacelated parts came away, and expoſed a large portion of the tibia, in two different places. To theſe pledgets of lint, dipped in the fluid, were applied, which not only appeared to prevent the injuries uſually attendant on theſe caſes, diſcolouration and exfoliation, but, on the contrary, in the courſe of eight days, the parts thus expoſed were covered with granulations; and at the expiration of fourteen days, the whole of the ſoft parts were perfectly re-united, and the ſurface of the ulcers reduced to a ſore

of about two inches and a half diameter, with granulations, ſmall, compact, and of a beautiful florid colour. It is now, Nov. 10, perfectly healed, and the patient, although a very luſty man, enabled, by the aſſiſtance of an elaſtic bandage, to attend the duties of the ſhip.

After the three firſt dreſſings, the gaſtric fluid of the ſheep was uſed; from the ſhip's being at ſea, we were not enabled to obtain any from the bullocks.

To remedy this patient's ill health, an aperient medicine was firſt given; after which he was directed to take half a dram of Peruvian bark, in two ounces of the decoction, every ſix hours. He was, at the ſame time, directed to make uſe of as many lemons and onions in the courſe of the day, as his ſtomach could eaſily bear. It was aſtoniſhing to obſerve with what rapidity he gained ſtrength, after the ſphacelated parts were thrown off.

Since this trial I have had the ſatisfaction of finding the gaſtric fluid ſucceed in more than a hundred inſtances, where ſphacelus had occurred. And the teſtimonies of its peculiar good effects, in ſimilar caſes, by Mr. Jones, ſurgeon to the naval hoſpital at Baſtia, and by Meſſrs. Read and Buck, two of his principal aſſiſtants, convince me of the propriety of making its efficacy generally known.

I have, at preſent, a patient in the Dolphin, a ſeaman belonging to the Barfleur, who, by long confinement in bed, in a typhus fever, became excoriated in three different places, which all terminated in extenſive mortifications. The ſphacelated parts, in this caſe, were entirely removed by the application of the gaſtric fluid; and the patient is now ſufficiently recovered to walk about.

Mediterranean, Nov. 10, 1796.

ERRATUM.

In Dr. WOODHOUSE's anſwer to Dr. MACLEAN, in the ſecond volume of the *Medical Repoſitory*, p. 400, 29th line from the top, the following ſentence ſhould have been inſerted:

"The next thing which engages your attention relates to finery cinder and charcoal. It is aſſerted by Dr. Prieſtley, that great quantities of inflammable air may be procured from theſe ſubſtances, though both may have been previouſly expoſed to ever ſo high a degree of heat."